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VALIDATION OF THE GENUS *LAUTISPOROPSIS*

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ABSTRACT

The genus *Lautisporopsis* is validated so as to conform to the International Code of Botanical Nomenclature.

INTRODUCTION

Lautisporopsis circumvestita (Kohlm.) E.B.G. Jones, M. Yusoff et S.T. Moss (Yusoff, Jones and Moss, 1994) was considered under Article 37.1 invalid (Anon, 1995). To meet these requirements the generic name is validated here, and the name of its type species properly established.
Lautisporopsis E.B.G. Jones, M. Yusoff and S.T. Moss, *gen. nov.* (Yusoff, Jones and Moss, 1994).

Holotype : *Lautisporopsis circumvestita* (Kohlm.) E.B.G. Jones, M. Yusoff et S.T. Moss comb. nov.
≡*Halosphaeria circumvestita* Kohlm.
Nova Hedwigia 2: 307, 1960.
≡*Ceriosporopsis circumvestita* (Kohlm.) Kohlm.
Can. J. Bot. 50: 1953, 1972

Holotype :
J.K. No. 200. In Herb. Mus. Bot. Berol. (*B*)
In decayed wood from San Juan, Friday Harbor (Washington). 20:11:1960.

The species has been widely collected (Byrne and Jones, 1974; Jones, 1985; Cuomo, Jones and Grasso, 1988) and is well documented (Kohlmeyer and Kohlmeyer, 1979; Kohmeyer and Volkmann-Kohlmeyer, 1991). However, the fungus is somewhat infrequent in its occurrence and distribution, in temperate coastal waters.

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SPECIES OF COLLETOTRICHUM ON GINSENG (PANAX)

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Abstract

We review three *Colletotrichum* species that reportedly infect ginseng (*Panax* species). *C. dematium* and *C. coccodes* are associated with *P. quinquefolius* in the United States. *C. panacicola* causes anthracnose of *P. ginseng* in Korea, China, eastern Russia, and Japan. *C. dematium* and *C. coccodes* are cosmopolitan fungi reported from many plant hosts. *C. panacicola* is limited to *P. ginseng*. The correct author citation for this taxon is *C. panacicola* Uyeda & S. Takim. No types nor authentic specimens of *C. panacicola* could be located; the taxon remains untypified. Descriptions and illustrations of *C. panacicola* closely resemble those of *C. coccodes.*

Introduction

American ginseng, *Panax quinquefolius* L., is cultivated in the United States, Canada, and recently in China. Korean ginseng, *Panax ginseng* C.A. Meyer, is cultivated in Korea, China, Russia, and Japan. Anthracnose is an uncommon but potentially devastating disease of cultivated ginseng. A review of the literature reveals three *Colletotrichum* species reportedly cause anthracnose of two *Panax* species. These pathogens have never been collectively examined. The genus *Colletotrichum* Corda is quite unwieldy, containing about 600 taxa. Grouping *Colletotrichum* species by their host range is a more natural way of studying the genus in surmountable subunits, as has been done with the genus *Septoria* Saccardo (McPartland 1995). These compilations and comparisons are especially useful when cultures are lacking.

Herein we review *Colletotrichum* on *Panax*, including literature citations, morphological descriptions, the disease symptoms they cause, and their taxonomic status.

1. ***Colletotrichum dematium*** (Pers.) Grove, J. Botany (London) 56:341, 1918.
≡*Vermicularia dematium* Pers.: Fr., 1849.

Description: Acervuli fusiform in outline, long axis parallel to host's stem, up to 300 µm long, strongly erumpent through epidermis. Setae divergent, smooth, stiff, rarely curved, dark brown, usually 3-4 septate, 6-8.5 µm wide at the base tapering to sharpened apices, up to 3100 µm long. Conidiophores hyaline, cylindrical, occasionally septate and branched at their base. Phialoconidia hyaline, nonseptate, smooth, thin-walled, guttulate, falcate and curved, 24-27 µm long and 3-4 µm wide in the middle and tapering to pointed apices.

Specimens examined: USA: Vermont, Cuttingsville, leg: D. Brigham, det: J. McPartland, from stems of *P. quinquefolius* - 8.VII.1995 (BPI#749471). New York, Rose Hill, leg: C.D. Ramsey, det: H.H. Whetzel, from stems of *P. quinquefolius* - 1.VII.1905 (BPI#0362203). New York, Rose Hill, leg & det: H.H. Whetzel, from stems of *P. quinquefolius* - 19.VII.1905 (BPI#0362202).

The Vermont specimen described above differs from the description of *C. dematium* by von Arx (1957) by its smaller acervuli, larger setae, and larger conidia. It still probably belongs in what Sutton (1980) calls "the *C. dematium* group."

Reed (1905) first described *C. dematium* causing a stem anthracnose on American ginseng (*P. quinquefolius*) in Missouri. He provided camera lucida drawings of the causal organism and described symptoms: "The first indication of injury was seen when one leaflet after another turned brown; afterwards the disease spreads down the petiole to the main stalk. Other stalks were attacked so badly that they broke off and fell over before the upper portions had even become wilted." Orton (1907) cited *C. dematium* causing stem anthracnose in Tennessee ginseng. Whetzel & Rosenbaum (1912) observed identical symptoms in New York, but considered *C. dematium* a saprophyte and secondary invader of ginseng previously infected by *Alternaria panax* Whetzel. Pathogenicity studies were not conducted.

Nakata & Takimoto (1922) cited Reed's report of *Vermicularia dematium* in Missouri. They noted this ginseng disease did not occur in Chosen, Korea (their agricultural experiment station). Miller *et al.* (1960) cited *C. dematium* on *P. quinquefolius*, "causing a secondary leaf spot. N.Y. to N.C., Mo., and Minn." Miller *et al.* (1960) based their citation on two sources: voucher specimens and literature maintained at BPI. Two voucher specimens of *C. dematium* on *P. quinquefolius* exist at BPI, both collected in New York (one is mislabeled "Virginia") and determined by H.H. Whetzel as *Vermicularia dematium*. The literature citations indexed by Miller *et al.* are still maintained at BPI on index cards. The index cards contain four citations: Reed (1905), Orton (1905, 1907), and Whetzel & Rosenbaum (1912).

Polczinski (1982) reported *C. dematium* from Wisconsin ginseng: "This fungus attacks leaves and stems of ginseng plants and may cause spotting and blighting of plants similar to that of *Alternaria* blight." In 1995 C. *dematium* was collected in Vermont, causing a stem anthracnose.

C. *dematium* occurs on over 100 hosts as a weak pathogen and saprophyte. Von Arx (1957) lists about 80 additional synonyms, complete with literature citations.

2. ***Colletotrichum coccodes*** (Wallroth) Hughes, Can. J. Bot. 36:754, 1958.
=*Colletotrichum atramentarium* (Berk. & Broome) Taubenh., 1916.

Description: Acervuli *in vitro* round or oval in outline, reaching 1 mm in diameter, covered by colorless to salmon-orange conidial masses and bristling setae. Setae arising from acervuli or sclerotia, smooth, stiff, septate, slightly swollen and dark brown at the base and tapering to sharpened and paler apices, up to 100 µm long. Conidiophores hyaline, cylindrical, occasionally septate and branched at their base. Conidiogenous cells smooth, hyaline, with a minute channel and periclinal thickening of the collarette. Phialoconidia hyaline, aseptate, smooth, thin walled, guttulate, fusiform and straight, with rounded apices, often with a slight median constriction, ranging 16-22 x 3.4 µm in culture.

Specimen examined: USA: Wisconsin, Berlin Township, leg, det: J. McPartland, from soil sample cultured on potato dextrose agar - 20.VIII.1984.

McPartland (1985) isolated C. *coccodes* from Wisconsin soil previously planted in ginseng, part of an inconclusive study investigating the "ginseng re-plant problem." Whether C. *coccodes* actually causes ginseng disease cannot be ascertained, because no pathogenicity studies were conducted.

C. *coccodes* commonly causes a root rot of solanaceaous crops (tomatoes, potatoes, eggplants), as well as cabbage, mustard, lettuce, chrysanthemums and many weed hosts. Over a dozen synonyms of C. *coccodes* are cited by von Arx (1957), complete with literature citations.

3. ***Colletotrichum panacicola*** Uyeda & S. Takim. *in* S. Takimoto, Chosen Nokwai ho **14**:24, 1919.

The original description by Takimoto (1919) is simple: C. *panacicola* arises in aggregations of mycelia forming "pseudosclerotia" bearing spores and setae. Setae are dark colored at base, paler at ends, 1-3 septate, 31-144 x 2.4-8.4 µm. Spores cylindrical, rounded at ends, hyaline, nonseptate, 17.0-22.1 x 3.4-5.1 µm.

Nakata & Takimoto (1922) elaborated on the description, "Mycelia septate, hyaline, 2.4-6.2 µm diameter; setae dark olive colored, 1-3 septate, 31-144 x 2.4-8.4 µm, only 2-4 setae from each acervulus; conidiophores hyaline without septa; conidia cylindrical, straight or slightly curved, nonseptate, rounded at ends, 17.0-22.1 x 3.4-5.1 µm; chlamydospores [appressoria] formed on germination of conidia, piriform, olive colored, 14.0 x 8.0 µm." From their illustration of C. *panacicola* we see that acervuli are erumpent, setae taper to sharpened apices, conidia are finely guttulate, and appressoria are complex with smooth, entire edges (Fig. 1).

C. *panacicola* Uyeda & S. Takim. is known under a variety of author citations. Nakata & Takimoto (1922) described C. *panacicola* a second time as a "new species." Thus, Petrak (1953) and Gutnikova (1963) cited the taxon as *C. panicicola* Nakata & Takimoto. Chung (1974) cited it as *C. panicicola* Uyeda *et al.*

C. panacicola was originally collected from leaves and stems of *P. ginseng* near Chosen, Korea. Subsequently *C. panicicola* has been reported in other Korean locations (Chung 1974, Ohh 1981), China (Li & Yang 1988), eastern Russia (Gutnikova 1963, Latysheva & Sevriuk 1981), and Japan (Kishi 1988).

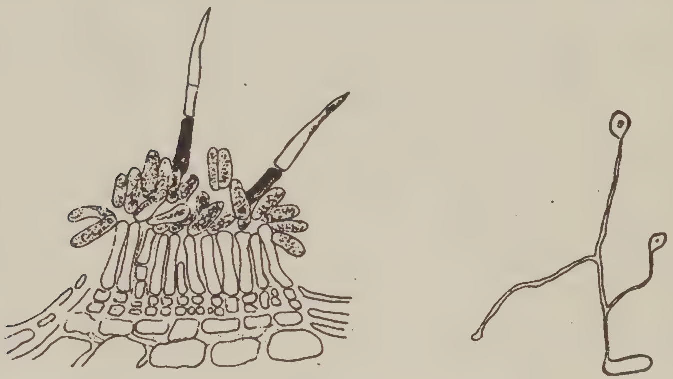

Fig. 1. Photocopy of illustration of *Colletotrichum panacicola* in Nakata & Takimoto (1922). Left, acervulus with setae, conidiophores, and conidia; Right, germinating conidium with three appresoria.

Takimoto (1919) described disease symptoms as circular or amorphous leaf spots which turned brown, then defoliated. Leaflets wilted in wet climates. Nakata & Takimoto (1922) provided a slightly different description of symptoms: "On leaves and stems of ginseng, causing purplish brown irregular or nearly circular spots with reddish margins, or sometimes in wet seasons dark green blighted appearance over the leaves." Latysheva & Sevriuk (1981) described leaf spots as sharply delineated, then leaflets wilted and dehisced. Gutnikova (1963) described concentric rings developing within leaf spots, the spots subsequently necrosed and crumbled, leaving holes in leaflets. Leaflets subsequently dehisced. Petioles and stems also developed spots and fruiting bodies.

Takimoto (1919) fulfilled Koch's postulates, demonstrating *C. panacicola* was a genuine pathogen of *P. ginseng*. Ohh (1981) described *C. panacicola* causing up to 47% crop losses, whereas Chung (1974) considered the pathogen of minor importance. Latysheva & Sevriuk (1981) noted disease intensity increased in proportion to the age of plants; 6-year-old plants suffered much more damage than 1-year-old plants. Disease increased in areas where shade construction was damaged, permitting direct sunlight and rainfall to stress plants. A previous infection by *Phythophthora cactorum* (Lebert &

Cohn) Schröter or *Phoma panacis* Nakata & Takimoto also predisposed plants to *C. panacicola*, "but harm caused by these pathogens is not considerable compared to anthracnose" (Latysheva & Sevriuk 1981). Gutnikova (1963) noted disease peaked in plants exposed to direct sunlight, in temperatures of 20-25^{o}C and relative humidity of 70-80%.

The type specimen of *C. panicicola* proved impossible to locate. Neither Uyeda, Takimoto, nor Nakata are included among collectors listed by Vegter (1983). Professor In Kyu Lee, curator at herb. SNU, did not know of any specimens in Korea, and suggested checking herbaria in Japan (personal communication, 1995). Dr. Takao Kobayashi, an expert on *Colletotrichum* in Japan, was familiar with *C. panicicola* but never located a specimen (personal communication, 1996). Dr. Hideo Nasu, a phytopathologist in communication with *P. ginseng* cultivators in Japan, could not locate a specimen (personal communication, 1997). Dr. Yoshimichi Doi, curator at TNS, did not know of a specimen, nor did Japanese curators at TI or KYO, Chinese curators at CMMI, PE, or HMAS, nor American curators at BPI, F, or WIS.

Thus *C. panicicola* remains untypified, pending location of a Korean, Chinese, or Japanese specimen that matches the description by Takimoto (1919). We considered chosing the illustration of *C. panicicola* in Nakata & Takimoto (1922) as lectotype (Fig. 1). Choosing an illustration as lectotype is permitted under the ICBN (Article 9.3). Indeed, the lectotype of *Panax ginseng*, host of *C. panicicola*, is an illustration (Baranov 1982). But the illustration in Nakata & Takimoto (1922) does not qualify as "original material," so it cannot serve as lectotype.

Is *C. panicicola* a synonym of either aforementioned *Colletotricum* species? Von Arx (1957) did not treat *C. panicicola*. From descriptions and illustrations, the morphology of *C. panicicola* is similar to that of *C. coccodes*. We suspect *C. panicicola* is a synonym of *C. coccodes*, but until specimens can be located, we refrain from making this synonymy.

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The BPI curator is thanked for loan of specimens. Prof. Richard Korf (Plant Pathology Herbarium, Cornell University) is thanked for his coordination and pre-submission review. Prof. Lawrence Datnoff (University of Florida) also provided a pre-submission review.

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NOTES ON CONIDIAL FUNGI. XVI. A NEW SPECIES OF *DENDRYPHIOSPHAERA* AND SOME NEW RECORDS FROM CUBA

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ABSTRACT

Dendryphiosphaera uniseptata *anam. -sp. nov.*, distinguished by conidiophores profusely branched at the apex and clavate to cuneate, 1-septate, pale brown conidia is described and illustrated. It was found on leaf litter in a rainforest in Cuba. Thirty-four conidial fungi recorded for the first time from Cuba are listed and some of them illustrated.

RESUMEN

Se describe e ilustra ***Dendryphiosphaera uniseptata*** *anam. -sp. nov.*, caracterizada por presentar conidióforos densamente ramificados en el ápice y conidios de claviformes a cuneiformes, uniseptados y de color marrón claro. Esta especie fue encontrada sobre una hoja caída en un bosque tropical en Cuba. Se relacionan treinta y cuatro hongos conidiales citados por primera vez en Cuba y algunos de ellos también se ilustran.

TAXONOMIC PART

Dendryphiosphaera uniseptata Castañeda Ruiz et Guarro, *anam. -sp. nov.*
Etymol. Latin with one septum. (Figs. 1, 2)

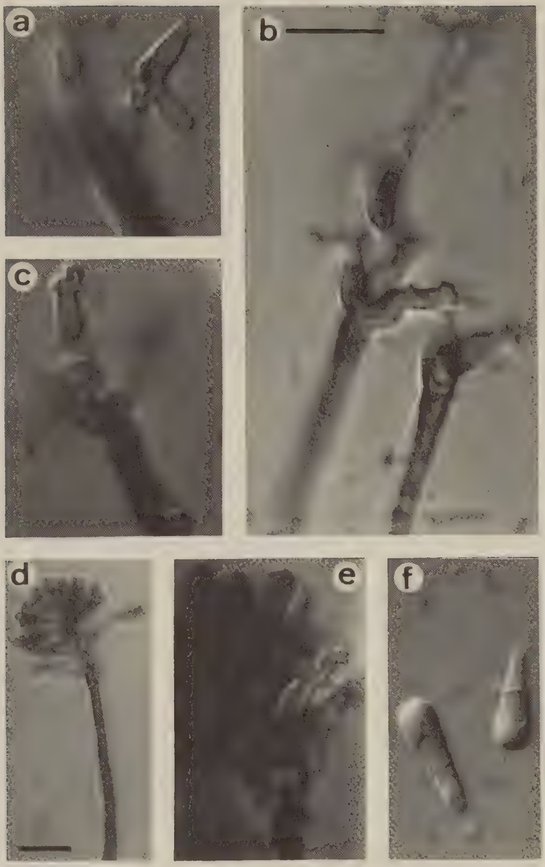

Fig. 1.- ***Dendryphiosphaera uniseptata*** (INIFAT C95/109). a-c,e) conidiogenous cells; d) upper part of conidiophore; f) conidia (bar = 10 µm in a-c,e,f; bar = 10 µm in d).

Ad fungos conidiales, hyphomycetes pertinens. Coloniae effusae, pilosae, amphigenae, brunneae. Mycelium plerumque in substrato immersum, ex hyphis septatis, laevibus, ramosis, brunneis, 1.5-2.5 µm diam, compositum. Conidiophora macronematosa, mononematosa, erecta, recta, 4-9-septata, levia, brunnea ad basim et pallide brunnea ad apicem, 140-200 x 5-8 µm, cylindrica ad basim, profuse ramosa ad apicem, cum ramulis alternis seu verticillatis, interdum compactis fasciculatis, 10-28 x 3.0-3.5 µm, pallide brunneis, praedita. Cellulae conidiogenae polyblasticae, raro monoblasticae, discretae, sympodiales, denticulatae, 5-8 x 2.5-3.0 µm, dilute brunneae vel subhyalinae. Conidia clavata vel cuneiformia, uni-euseptata circa basim, 10-13

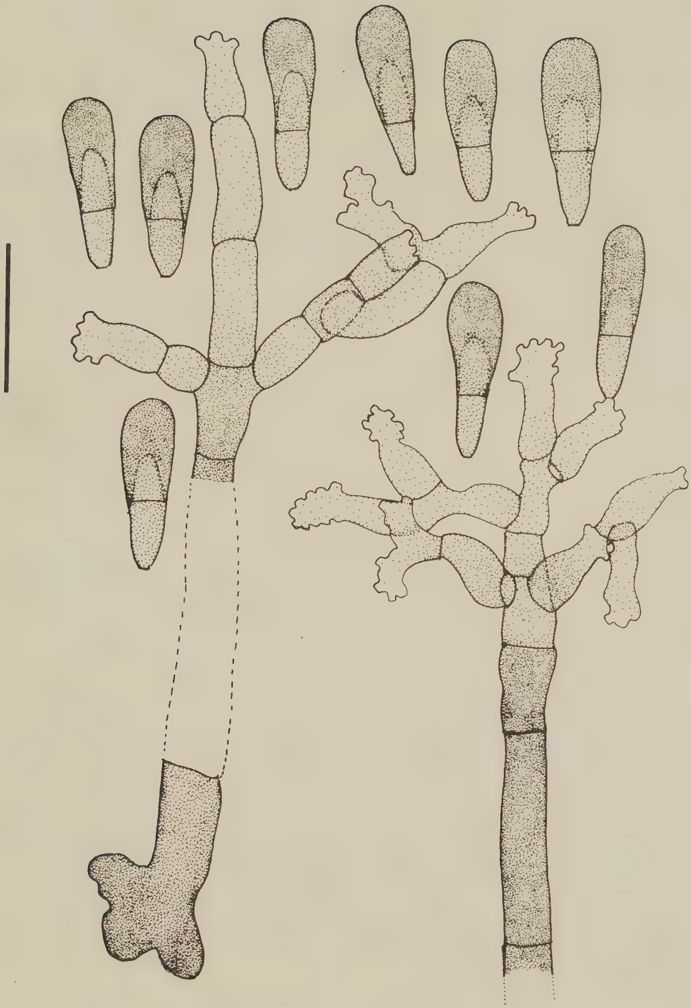

Fig. 2.- ***Dendryphiosphaera uniseptata*** (INIFAT C95/109). (Bar=10 µm).

x 2-3 µm, levia, sicca, dilute brunnea usque pallide olivacea, cum luminibus subhyalinis. Teleomorphosis ignota.

> **Substratum**: In foliis putridinis, in sylvarum pluviarum, Los Palacios, Holguín, Cuba. Leg. R. F. Castañeda Ruiz, 4-XII-1995.
> **Holotypus**: INIFAT C95/109, Santiago de Las Vegas, Cuba.
> **Isotypus**: MUCL 39942.

Conidial fungi, hyphomycetes. Colonies in natural substrate effuse, hairy, amphigenous, brown. Mycelium mostly immersed. Hyphae septate, smooth-walled, branched, brown, 1.5-2.5 µm diam. Conidiophores macronematous, mononematous, erect, straight, 4-9-septate, smooth, brown below, pale brown at the apex, 140-200 x 5-8 µm, cylindrical, profusely branched at the apex; branches alternate or verticillate, sometimes in compact clusters; branches 10-28 x 3.0-3.5 µm, pale brown. Conidiogenous cells polyblastic, rarely monoblastic, discrete, sympodial, denticulate, 5-8 x 2.5-3.0 µm, pale brown to subhyaline. Conidia clavate or cuneate, euseptate near the base, two-celled, 10-13 x 2-3 µm, smooth, dry, walls pale brown to pale olivaceous with cell lumina subhyaline. Teleomorph unknown.

Colonies on cornmeal agar reaching 8-10 mm diam. in 14 days at 25 ^{0}C , dark olivaceous, velutine, reverse dark brown to black. Conidia clavate to cuneate, 1-septate near the base, pale brown, smooth, 8-12 x 3-4 µm.

> **Substrate**: On rotten leaves, in rainforest litter, Los Palacios, Holguín, Cuba. Col.. R. F. Castañeda Ruiz, December 4, 1995.
> **Holotype**: INIFAT C95/109, Santiago de Las Vegas, Cuba.
> **Isotype**: MUCL 39942
> **Cultures deposited**: INIFAT C95/109 = MUCL 39942

The genus ***Dendryphiosphaera*** Lunghini & Rambelli (1978) is characterized by apically branched conidiophores and globose to lageniform , sometimes moniliform conidiogenous cells. Presently three species have been accepted, they are: ***D. taiensis*** Lunghini & Rambelli (1978) (the type species) with elliptical to cylindrical, equidistantly 2-septate conidia; ***D. minuta*** Vasant Rao & de Hoog (1985) with obovoidal and dark brown conidia with the distal septum near the middle; and ***D. parvula*** Nawawi & Kuthubutheen (1988) with obovoid, pale brown conidia, with the basal septum (euseptum) darkly pigmented, and the distal septum (distoseptum) lighter. All these species are clearly differentiated from ***D. uniseptata***.

FIRST RECORDS OF CONIDIAL FUNGI FROM CUBA

Ardhachandra cristaspora (Matsushima) Subramanian & Sudha, *Can. J. Bot.* 56: 729 (1979)

Specimen examined: INIFAT C94/187, on rotten leaf of *Clusia rosea*, Viñales, Pinar del Río, Cuba, R.F. Castañeda, 10 Aug. 1994. Cultures deposited: INIFAT C94/187 = CBS 319.95 = IMI 367536 = MUCL 39226.

Bipolaris crustacea (P.C. Hennings) J.L. Alcorn, *Mycotaxon* 15: 27 (1982)
Specimen examined: INIFAT C96/41-3, on twig of unidentified plant in rainforest, Holguín, Cuba, R.F. Castañeda, 4 Dec. 1995. Cultures deposited: INIFAT C96/41-3 = CBS 550.96.

Calcarisporium arbuscula Preuss, *Linnaea* 24: 124 (1851)
Specimen examined: INIFAT C92/145-1, on *Trichoderma* sp. in the gardens of INIFAT, Santiago de Las Vegas, Cuba, R. F. Castañeda, 1 Sep. 1992. Culture deposited: INIFAT C92/145-1.

Coniosporium memorandum (Penz. & Sacc.) M.B. Ellis, *Mycol. Pap.* 125: 2 (1971).
Specimen examined: INIFAT C93/336 on decaying leaf in the gardens of INIFAT, Santiago de las Vegas, Cuba, R.F. Castañeda, 25 Nov., 1993.

Coryneum calophylli (Sydow) Morgan-Jones, *Can. J. Bot.* 49: 1849 (1971)
Specimen examined: INIFAT C92/203, on dead leaves of *Calophyllum antillanum*, La Chorrera, Cuba, R. F. Castañeda and B. Kendrick, 14 Apr. 1992.

Cryptophiale minor M. Farr, *Mycotaxon* 11: 177 (1980)
Specimen examined: INIFAT C96/10-1, on decaying leaves of *Cedrela mexicana,* Holguín, Cuba, R.F. Castañeda, 4 Dec. 1995. Cultures deposited: INIFAT C96/10-1 = CBS 733.96

Cylindrocladium heptaseptatum Sobers, Alfieri & Knauss, *Phytopathol.* 65: 333 (1975)
Specimen examined: INIFAT C93/231, on rotten leaf in rainforest, Cabo de San Antonio, Pinar del Río, Cuba, R.F. Castañeda, 7 Sept. 1993. Cultures deposited: INIFAT C93/231 = MUCL 39012.

Dactylaria obtriangularia Matsushima, *Icon. Microfung. Matsushima lect.* p. 51 (1975) (Fig. 3.a)
Specimen examined: INIFAT C94/138-5, on rotten leaf, Gran Piedra, Cuba, R.F. Castañeda, 4 Nov. 1994.

Dictyochaeta ciliata (Onofri & Rambelli) Bhat & Kendrick, *Mycotaxon* 49: 43-44 (1993)
Specimen examined: INIFAT C94/29, on dead leaf of *Nectandra coriacea*, Cueva de los Portales, Pinar del Rio, Cuba, Damian Cruz, 5 Feb 1994. Cultures deposited: INIFAT C94/29 = MUCL 39027.

Endophragmiella cambrensis M.B. Ellis, *More Dematiaceous Hyphomycetes* CMI, Kew p. 143 (1976) (Fig. 3b,c)

Specimen examined: INIFAT C94/183, on bark, Viñales, Pinar del Río, Cuba, R.F. Castañeda, 6 Aug. 1994.

Endophragmiella curvata (Corda) Hughes, *N. Z. J. Bot.* 17: 148 (1979)
Specimen examined: INIFAT C 96/19, on decaying leaves of *Bucida palustris*, Holguín, Cuba, R. F. Castañeda, 5 Dec. 1995.

Endophragmiella dimorphospora (Awao & Udagawa) Hughes, *N. Z. J. Bot.* 17: 149 (1979) (Fig. 3d,e)
Specimen examined: INIFAT C94/185-1, on dead stem of unidentified Poaceae, Viñales, Pinar del Río, Cuba, R.F. Castañeda, 6 Aug. 1994.

Endophragmiella subolivacea (Ell. & Everh.) Hughes, *Fungi Canadenses* 129 (1978)
Specimen examined: INIFAT C96/40, on twig of unidentified plant, Holguín, Cuba, R. F. Castañeda, 4 Dec. 1995.

Fusarium camptoceras Wollenweber & Reinking, *Phytopathol.* 15: 158 (1925)
Specimen examined: INIFAT C95/ 102, on rotten leaves, Los Palacios, Holguín, Cuba, R. F. Castañeda, 4 Dec. 1995. Cultures deposited: INIFAT C95/ 102 = CBS 544.96.

Fusarium polyphialidicum Marasas, Nelson, Toussoun & Van Wyk, *Mycologia*, 78: 678 (1986)
Specimen examined: INIFAT C91/223-6F, on fallen leaf of *Macadamia ternifolia* in the gardens of INIFAT, Santiago de Las Vegas, Cuba, R. F: Castañeda, 4 Dec. 1991. Cultures deposited: INIFAT C91/ 223-6F = CBS 256.93.

Gliocladiopsis tenuis (Bugnicourt) Crous & Wingfield, *Mycol. Res.* 97: 446 (1993)
Specimen examined: INIFAT C96/16-2, on rotten leaves, Los Palacios, Holguín, R.F. Castañeda, 6 Dec. 1995. Cultures deposited: INIFAT C96/ 16-2.

Idriella *anam.* ***Lambertellinia scutuloides*** Korf & Lizóñ., *Mycotaxon* 50: 168 (1994)
Specimen examined: INIFAT C96/26, on rotten leaves, Los Palacios, Holguín, Cuba, R. F. Castañeda, 3 Dec. 1995. Cultures deposited: INIFAT C96/ 26 = CBS 594. 96.

Isthmolongispora variabilis Matsushima, *Icon. Microfung. Matsushima lect.* p. 90 (1975) (Fig. 3h)

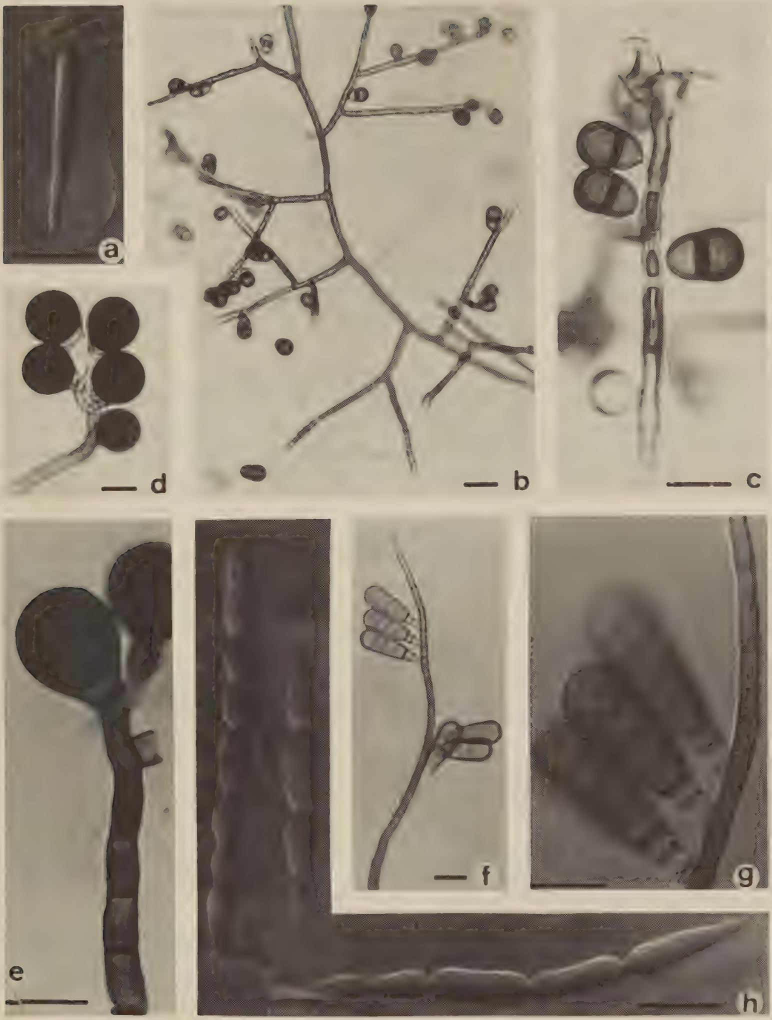

Fig. 3 - ***Dactylaria obtriangularia*** (INIFAT C94/138-5): a) conidium. ***Endophragmiella cambrensis*** (INIFAT C94/183): b) conidiophores, conidiogenous cells and conidia; c) conidiogenous cell. ***Endophragmiella dimorphospora*** (INIFAT C94/185-1): d) conidiophore and conidia; e) conidiogenous cell and conidia. ***Sporidesmiella cuneiformis*** (INIFAT C94/196): f) conidiophore and conidia; g) pseudopercurrent proliferations and conidia. ***Isthmolongispora variabilis*** (INIFAT C94/180): h) conidia . (Bar = 10 µm; in b, bar = 20 µm).

Specimen examined: INIFAT C94/180, on dead leaf of *Buchehavia capitata*, Santiago de Cuba, Cuba, R.F. Castañeda, 2 Nov, 1994. Cultures deposited: INIFAT C94/180 = CBS 243.95 = MUCL 39141.

Mahabalella acutisetosa B. Sutton & Patil, *Nova Hedwigia* 11: 203 (1966)
Specimen examined: INIFAT C92/69, on rotten leaves, San Antonio de los Baños, Cuba, R. F. Castañeda, 2 Feb. 1992.

Matsushimomyces indicus V. G. Rao & Varghese, *Bot. Notiser* 32 : 313 (1979)
Specimen examined: INIFAT C96/52, on rotten leaves, Holguin, Cuba, R. F. Castañeda, 4 Dec. 1995. Cultures deposited: INIFAT C96/52 = CBS 543.96.

Oidiodendron maius Barron, *Can. J. Bot.* 40: 600 (1962)
Specimen examined: INIFAT C94/136-1, on leaf litter of *Buchehavia capitata* in rainforest, Santiago de Cuba, Cuba, R. F. Castañeda, 4 Nov. 1994. Cultures deposited: INIFAT C94/136-1 = CBS 247.95 = IMI 367527 = MUCL 39169.

Oidiodendron tenuissimum (Peck) Hughes, *Can. J. Bot.* 36: 790 (1958)
Specimen examined: INIFAT C93/226, on bark of *Quercus oleoides var. sagraeana,* Viñales, Cuba. R. F. Castañeda, 21 Apr. 1992 Cultures deposited: INIFAT C93/ 226.

Pestalotia coffeae Zimmerman, *Med. uit's. Lands-Plantentuin* 67: 74 (1904).
Specimen examined:INIFAT C96/44-4, on decaying leaves in rainforest, Holguin, Cuba, R. F. Castañeda, 5 Dec. 1995. Cultures deposited: INIFAT C96/44-4 = CBS 600.96.

Phialocephala xalepensis A. M. Persiani & O. Maggi, *Mycotaxon* 20: 253 (1984)
Specimen examined: INIFAT C93/224, on leaf of *Lasiacis divaricata*, in rainforest La Chorrera, La Habana, Cuba, R.F. Castañeda, 24 Apr. 1993. Cultures deposited: INIFAT C93/224 = CBS 562.93.

Pilidium concavum (Desm.) Höhn., *Sber. Akad. Wiss. Wien* 124: 148 (1915)
Specimen examined: INIFAT C91/86, on rotten leaves in rainforest, La Estrella, Buey Arriba, Cuba, R. F. Castañeda, 14 Jan. 1991.

Polyscytalum gracilisporum (Matsushima) B. Sutton & Hodges, *Nova Hedwigia* 28: 488 (1976) (Fig. 4b)
Specimen examined: INIFAT C94/174, on rotten leaf, Santiago de Cuba, Cuba, R.F. Castañeda, 2 Nov. 1994.

Sesquicillium microsporum (Jaap) Veenbaas-Rijks & W. Gams, in Gams, W. *Cephalosporium-artige Schimmelpilze (Hyphomycetes):* Stuttgart, p. 226 (1971)

Specimen examined : INIFAT C90/100-1, on twigs of *Quercus oleoides var. sagraeana*, San Juan y Martínez, Cuba, R. F. Castañeda, 24 March 1990. Culture deposited: INIFAT C90/100-1.

Speiropsis scopiformis Kuthub. & Nawawi, *Trans. Brit. Mycol. Soc.* 89: 584 (1987)

Specimen examined: INIFAT C96/43, on rotten leaves in rainforest, Holguín, Cuba, R. F. Castañeda, 5 Dec. 1995. Cultures deposited: INIFAT C96/43 = CBS 493.96.

Speiropsis simplex Matsushima, *Bull. Nat. Sci. Mus.*, 16: 475 (1971)

Specimen examined: INIFAT C92/131, on dead leaf of *Eucalyptus* sp., Ciénaga de Zapata, Cuba, R. F. Castañeda, 30 Apr. 1992.

Sporendocladia foliicola (P.M. Kirk) Wingfield, *Trans. Brit. Mycol. Soc.* 89: 515 (1987)

Specimen examined: INIFAT C94/164, on dead leaf of *Eucalyptus grandis*, Sandino, Pinar del Río, R.F. Castañeda, 8 Aug, 1994. Cultures deposited: INIFAT C94/164 = CBS 201. 95 = MUCL 39126.

Sporidesmiella cuneiformis (B. Sutton) P.M. Kirk, *Trans. Brit. Mycol. Soc.* 79: 481 (1982) (Figs. 3f,g; 4c)

Specimen examined: INIFAT C94/196, on dead leaves of *Clusia rosea*, Viñales, Pinar del Río, Cuba, R.F. Castañeda, 6 Aug. 1994.

Sporidesmiella hyalosperma (Corda) P.M. Kirk var. ***hyalosperma*** P.M. Kirk, *Trans. Brit. Mycol. Soc.* 79: 481 (1982)

Specimen examined: INIFAT C94/141, on decaying leaf of *Roystonea regia*, Viñales, Pinar del Río, Cuba, R.F. Castañeda, 10 Nov, 1994. INIFAT C94/145-2, on dead gras litter, Viñales, Pinar del Rio, Cuba, R.F. Castañeda, 10 Nov. 1994. INIFAT C94/148, on rotten leaf of *Eucalyptus sp.* Sandino, Pinar del Río, Cuba, R.F. Castañeda, 8 Nov, 1994. Cultures deposited: INIFAT C94/145-2 = CBS 211.95, INIFAT C94/148 = CBS 212.95= MUCL 39150.

Sporidesmium goidanichii (Rambelli) Hughes, *N. Z. J. Bot.* 17: 162 (1979) (Fig. 4a)

Specimen examined: INIFAT C94/151, on needles of *Pinus caribense*, Pinar del Rio, Cuba, R.F. Castañeda, 6 Aug, 1994. INIFAT C94/175-2, on rotten leaf, Santiago de Cuba, Cuba, R.F. Castañeda, 2 Nov. 1994.

Subulispora britannica B. Sutton, *Trans. Br. Mycol. Soc.* 61: 422 (1973)

Specimen examined: INIFAT C94/175, on rotten leaf of *Bucida palustris*, Gran Piedra, Santiago de Cuba, Cuba, R.F. Castañeda, 2 Nov. 1994. Cultures deposited: INIFAT C94/175 = CBS 312. 95 = IMI 367524 = MUCL 39140.

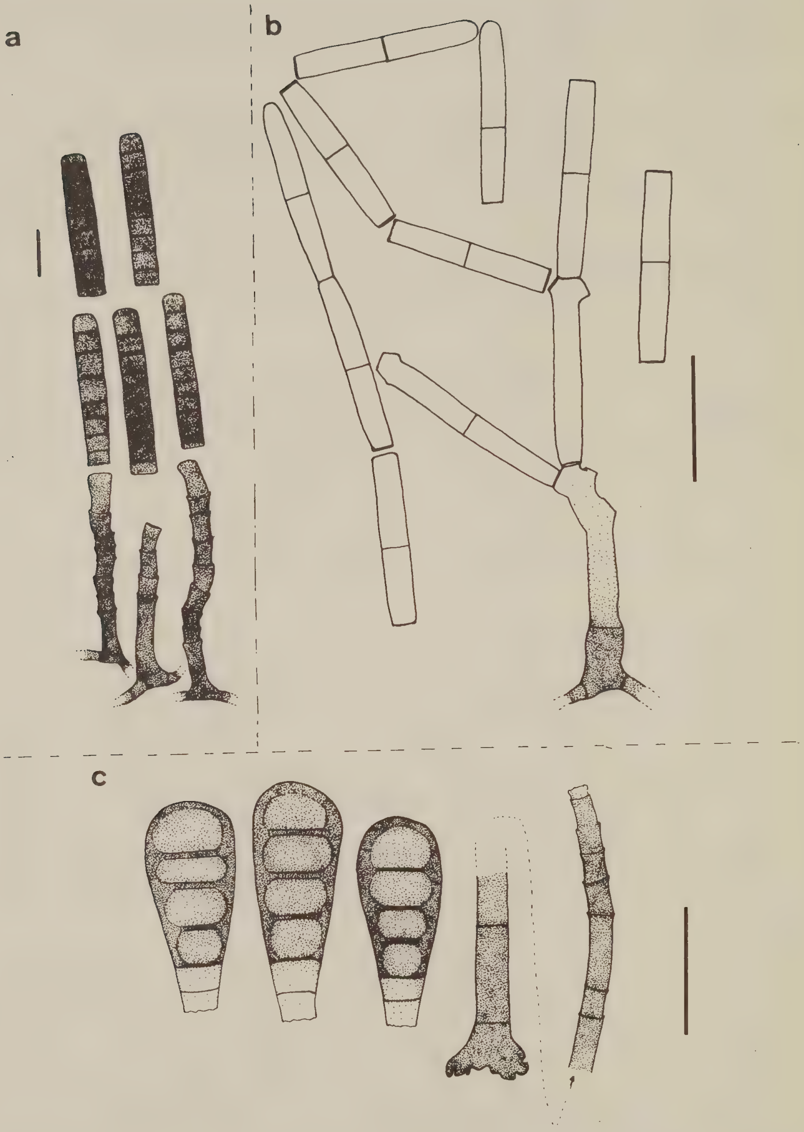

Fig. 4.- ***Sporidesmium goidanichii*** (INIFAT C94/151). a) conidiophores and conidia. ***Polyscytalum gracilisporum*** (INIFAT C94/174). b) conidiophore and conidia. ***Sporidesmiella cuneiformis*** (INIFAT C94/196). c) conidiophore and conidia. (Bar = 10 μm).

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DISCOMYCETES OF TROPICAL CHINA. I. COLLECTIONS FROM HAINAN ISLAND[*]

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ABSTRACT: Discomycetes collected from Hainan Island were examined. Twenty-three species and 1 variety belonging to 15 genera were identified. *Lachnum hainanense* is described as new species and *Dasyscyphus singerianus* is transferred to *Lachnum*. *Lachnum singerianum* and *Orbilia* cf. *fimicola* are reported for the first time from China. Previous records from Hainan Island for which specimens are not available are also listed. Fifty-four taxa were found in the areas.

This is the first in a series of papers to report on the discomycetes of tropical China. Hainan Island is located in the southwest of Guangdong Province, separated from the mainland by Qiongzhou Strait, and more or less pear-shaped on the map. Capital city of Hainan Province, Haikou (close to N 20, E 110), is in the northern point of Hainan Island which is entirely in the tropical region (Fig. 1). The central mountainous region of the island is mostly 500-800m in elevation, but reaches 1867m at the highest point. The surrounding coastal areas are flat.

Previous discomycete records of Hainan Island were summarized in "Fungi of China" by Teng (1963, 1996) in which names of 37 species and 2 varieties were included. A recent expedition to that region was organized by the Systematic Mycology & Lichenology Laboratory, Chinese Academy of Sciences in April of 1993. Recent collections were kindly provided by Ms. S. Lin, our former colleague. Unfortunately, specific localities and dates of collections were not recorded. The areas surveyed on that trip were Bawanglin, Danzhou (Danxian, Nada), Diaoluoshan, Jianfeng, Limushan, Sanya, Wuzhishan, and Xinglong. This study is based on early material on deposit in the Herbarium Mycologicum Instituti Microbiologici Academiae Sinicae (HMAS) and collections made in 1993. Collecting sites are shown on the map (Fig. 1). Specimen information of the 24 taxa examined by the authors is included in the paper. Teng cited provinces where taxa occurred but did not offer

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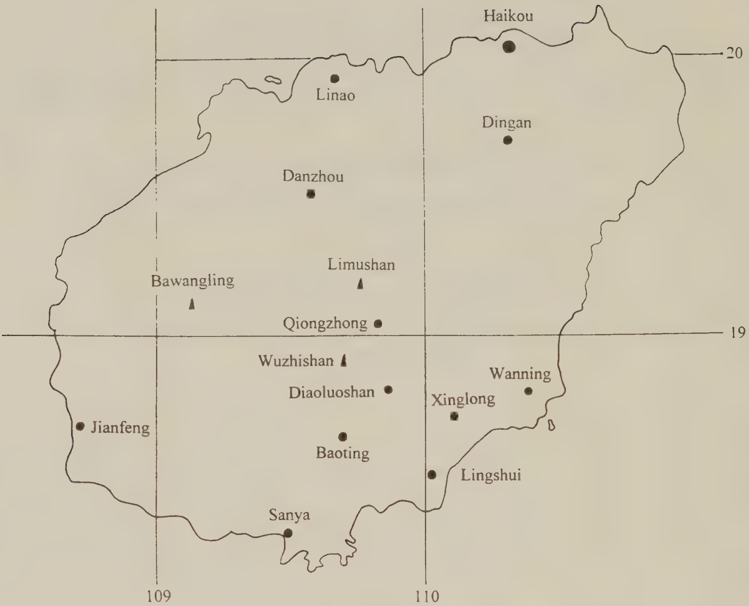
Haikou
Linao
Dingan
Danzhou
Limushan
Bawangling
Qiongzhong
Wuzhishan
Diaoluoshan
Wanning
Xinglong
Jianfeng
Baoting
Lingshui
Sanya
20
19
109
110

Fig. 1. A map of Hainan Island: showing collecting sites.

further collection information in his "Fungi of China" (Teng, 1963, 1996). We believe that some of them are in HMAS. Teng's records are recorded here with an asterisk (*). Where his specimens were unavailable to confirm their current taxonomic status, his names were cited without change. Fifty-four taxa of Hainan discomycetes are reported in this paper. *Lachnum hainanense* is described as a new species and *Dasyscyphus singerianus* is given a new combination in *Lachnum*.

Ascobolus cf. ***denudatus*** Fr.

On duff, S. Lin LPJ 036 (HN 13), IV 1993, HMAS 71991.

Compared with Brummelen's description (1967), the Chinese collection has thick and irregular warts or ridges on the ascospore surface, smaller ascospores [16.5-18.8 x 7.5-9.5 µm vs. (16-)18-22 (-23) x (8.5-)9.5-11.5 µm] and asci (125-155 x 11.0-12.5 µm vs. 170-230 x 16-23 µm) which are J- in Melzer's reagent and have a short base.

* ***Ascobolus scatigenus*** (Berk.) Brumm.

On cow dung, Nada, J.-H. Yu & R. Liu, 19 XII 1960, HMAS 30692; on horse dung, Lingshui, X.-K. Deng, 2 IV 1934, HMAS 56520.

* ***Ascobolus stercorarius*** (Bull.) Schroet.

On cow dung.

* ***Ascocoryne sarcoides*** (Jacq.) J. W. Groves & Wilson

On rotten wood.

The species was recorded as *Coryne sarcoides* (Jacq.) Tul. (Teng, 1963, 1996).

* ***Ascophanus granulatus*** (Bull.) Speg.

On cow dung.

Bisporella claroflava (Grev.) Lizon & Korf

= *Bisporella discedens* (P. Karst.) S. E. Carp.

On rotten twigs, S. Lin LPJ 028 (HN 12), IV 1993, HMAS 71990.

Morphology of the Chinese material is identical with description of *Bisporella discedens* (P. Karst.) S. E. Carp. (1975) and has *Cystodendron* Bubak anamorph arising from receptacle surface. Conidia are about 2-2.5 x 2 µm.

* ***Catinella olivacea*** (Batsch) Boud.

On rotten wood.

* ***Cenangium atrofuscum*** S. H. Ou

On bark of dead tree.

* ***Chlorociboria aeruginosa*** (Pers.) Seaver ex C. S. Ramamurthi, Korf & L. R. Batra

≡ *Chlorosplenium aeroginosum* (Oed.) De Not.

On wood, Dingan, X.-K. Deng, 11 XII 1934, HMAS 7160.

Chlorosplenium chlora (Schwein.) M. A. Curtis

on hard wood, Tan-hsien, S. Q. Deng 7195, 3 XII 1934, HMAS 9666.

Korf & Zhuang (1985) had a note on what was recorded as *Mollisia viridulo-mellea* Penz. & Sacc. by Teng (1963). One specimen from Hainan labelled as *M. viridulo-mellea* is not well-preserved. We tentatively identified the fungus as *Chlorosplenium chlora*.

Ciboria peckiana (Cooke) Korf

On wood, Danxian, X.-K. Deng, 13 X 1934, HMAS 7090.

* ***Cookeina insititia*** (Berk. & M. A. Curtis) Kuntze

See Wang (1997) for description and listing of specimens from Hainan.

* ***Cookeina speciosa*** (Fr.) Dennis

= *Cookeina sulcipes* (Berk.) Kuntze

See Wang (1997) for description and listing of specimens from Hainan.

* ***Cookeina tricholoma*** (Mont.) Kuntze

See Wang (1997) for description and listing of specimens from Hainan.

* ***Dasyscyphus ochroleuca*** Penz. & Sacc.

On decayed wood.

According to Teng (1963, 1996), ascospores of the fungus are similar to that of *Lachnum sclerotii* (A. L. Smith) J. H. Haines & Dumont but the latter are septate rather than continuous. The type specimen of *D. ochroleuca* could not be located in the Saccardo herbarium at PAD according to Haines (personal communication).

Dicephalospora rufocornea (Berk. & Broome) Spooner

On twigs, Dingan, X.-K. Deng, IX 1934, HMAS 7204; on rotten wood, Diaoluoshan, R.-Y. Zheng, 26 IX 1958, HMAS 26780; Baoting, J.-H. Yu & R. Liu, 31 VII 1960, HMAS 29387.

* ***Galiella javanica*** (Rehm in Henn.) Nannf. & Korf

≡ *Sarcosoma javanicum* Rehm

Nada, J.-H. Yu & R. Liu, 19 V 1960, HMAS 29564; X.-K. Deng, 8 XI 1934, HMAS 56524.

* ***Geoglossum umbratile*** Sacc.

The fungus was reported as *Geoglossum nigritum* (Fr.) Cooke (Teng, 1963, 1996). According to Maas Geesteranus (1965), the correct name of the fungus is *G. umbratile*.

* "***Helotium***" ***buccinum*** (Pers.) Fr.

On dead wood.

HMAS 7090 from Hainan is the only specimen under *Helotium buccinum* on deposit in HMAS. Our examination indicates that it is *Ciboria peckiana* (Cooke) Korf.

* "***Helotium***" ***conformatum*** P. Karst.

On fallen leaves in woods.

Judged from Teng's description (1996), the fungus might be a species of *Hymenoscyphus* Gray.

* ***Helvella elastica*** Bull.

* ***Helvella lacunosa*** Afzel.

* ***Humarina xylariicola*** (Henn. & E. Nyman) Teng

On *Xylaria*.

Lachnum abnorme (Mont.) J. H. Haines & Dumont

= *Erinella sinensis* Teng

On wood, Yen-hsien, S.-Q. Deng, 25 VI 1934, HMAS 9019; on rotten bark, S. Lin LPJ 008 (HN 1), IV 1993, HMAS 71979; on rotten wood, S. Lin LPJ 019 (HN 5), IV 1993, HMAS 71983.

HMAS 71979 differs from other specimens in having sessile apothecia, deformed paraphysis apices, brown receptacle, wider ascospores, and hairs up to 190 µm long. A note on *Erinella sinensis* was provided by Korf & Zhuang (1985).

Lachnum cf. ***abnorme***

Apothecia solitary, discoid to flat, sessile, 0.4-0.8 mm in diameter when dry, margin entire; hymenium yellow and receptacle surface white when dry. Hairs on receptacle surface, granulate, subhyaline to hyaline, septate, thin-walled, mostly 50-85(-120) x 2-3 µm. Ectal excipulum of textura prismatica. Medullary excipulum of textura intricata. Asci clavate, 8-spored, J+ in Melzer's reagent, 70-96 x 7.5-9.0 µm, spores almost occupying the entire ascus. Ascospores subcylindrical, with 3-7 septa, hyaline, (33-)42-57 x 1.8-3.0 µm. Paraphyses lanceolate, with deformed apices, 3-4 µm wide at the upper portion.

On rotten bark, S. Lin LPJ 034 (HN 4), IV 1993, HMAS 71982.

HMAS 71982 has asci and ascospores which resembles those of *Lachnum abnorme* (Mont.) J. H. Haines & Dumont in size and shape, but it has sessile apothecia and hyaline to subhyaline hairs. It differs from any other collections of *L. abnorme* so far we have seen. We treat it as *Lachnum* sp. until more material is examined.

Lachnum brasiliense (Mont.) J. H. Haines & Dumont

On rotten bark, S. Lin LPJ 030 (HN 7), IV 1993, HMAS 71985; S. Lin LPJ 032 (HN 8), IV 1993, HMAS 71986; S. Lin LPJ 033 (HN 9), IV 1993, HMAS 71987; S. Lin LPJ 026 (HN 15), IV 1993, HMAS 71993.

Lachnum cf. ***calosporum*** (Pat. & Gaillard) J. H. Haines & Dumont

On rotten twigs, S. Lin LPJ 001 (HN 11), IV 1993, HMAS 71989.

Compared with the description of Haines & Dumont (1984), the Hainan material has shorter ascospores [45-90 x 1.8-2.5 µm vs. (20-)80-100(-130) x 2.1-2.8(-3.2) µm] which are subcylindrical with lower end narrower, narrower asci (9-11.5 µm wide vs. 10-15 µm wide), and longer hairs (60-100 µm long).

Lachnum hainanense W. Y. Zhuang & Zheng Wang, **sp. nov.** (Fig. 2)

Ab *Lachno haematino* ascis caeruleis obscure in jodis, 32-40 x 3.5-4.5 um, ascosporis 11.5-14.0 x 1.0-1.5 um, pilis cylindricis, non resinois, 40-76 x 2.5-3.5 um differt.

Apothecia solitary, discoid, stipitate, 0.2-0.7 mm in diameter and up to 1.2 mm in height when dry, margin entire, incurved when dry; hymenium yellowish-beige when dry; receptacle surface hairy, grayish-yellow when dry; stipes 1 to 2 times of the disc diameter in length. Hairs on surface of receptacle and stalk, granulate, not covered by resinous substances, cylindrical, subhyaline to pale yellow, thin-walled, 2-3-septate, mostly 40-76 x 2.5-3.5 µm. Ectal excipulum of textura prismatica, 8-25 µm thick; cells 13-24 x 4-7 µm, walls hyaline, slightly glassy, and thin. Medullary excipulum of textura intricata, 12-50 µm thick, hyphae hyaline. Hymenium 38-45 µm thick. Asci clavate, pore walls very faintly blue in Melzer's reagent, difficult to detect and might be treated as J – by some observers, 32-40 x 3.5-4.5 µm. Ascospores diagonally uniseriate to biseriate, narrowly fusoid with both ends sharply pointed, non-septate, with many small guttules, 11.5-14.0 x 1.0-1.5 µm. Paraphyses lanceolate, with pointed apices, 2-3 µm wide at the upper portion, exceeding asci by 5-6 µm.

Holotype: on both sides of rotten leaves of an unidentified dicotyledon tree, Hainan, China, S. Lin (HN 3), IV 1993, HMAS 71981.

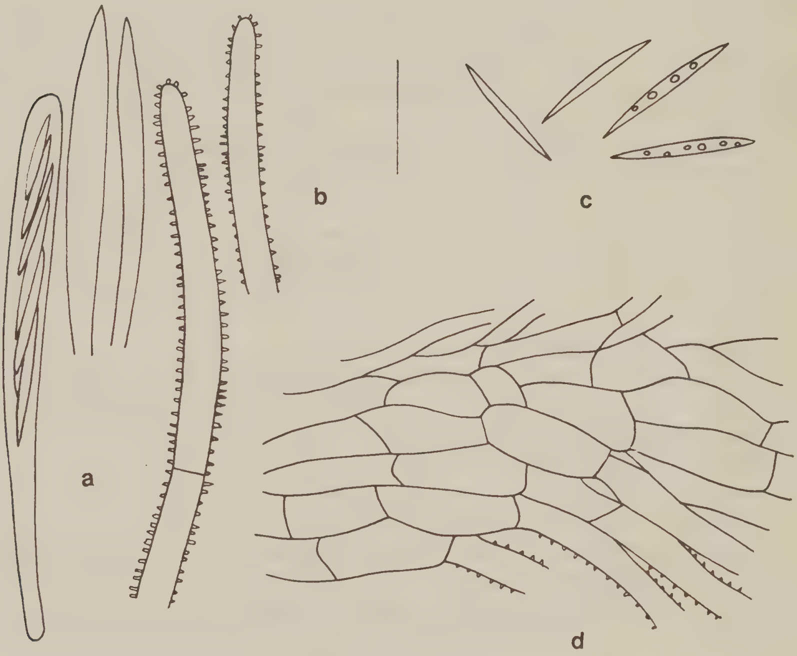

Fig. 2. *Lachnum hainanense*: **a**. an ascus with ascospores and paraphysis apices; **b**. upper portion of hairs; **c**. four ascospores; **d**. ectal excipulum at flank. Bar = 10 µm. From HMAS 71981.

Lachnum hainanense is similar to *L. haematinum* J. H. Haines (1992) on coriaceous leaves of Leguminosae in the shape and size of asci and of ascospores but differs from the latter in its hairs which are cylindrical, 40-76 x 2.5-3.5 µm, lack red resinous substances on their surface; asci faintly blue in Melzer's reagent, which is easily overlooked, 32-40 x 3.5-4.5 µm; ascospores slightly larger (11.5-14.0 x 1.0-1.5 µm vs. 9-13.5 x 0.9-1.3 µm); and in having distinctly lanceolate rather than filiform paraphyses. The exciple of *L. hainanense* in very thin, the ectal excipulum is 8-25 µm thick and medullary excipulum 12-50 µm thick.

L. hainanense has spores similar to those of *Lachnum ciliare* (Schrad.) Sacc. but smaller asci (32-40 x 3.5-4.5 µm vs. 50-60 x 6 µm) and ascospores (11.5-14.0 x 1.0-1.5 µm vs. 15-22 x 2-3 µm) and lacks crystals on hair tip (Dennis, 1949). *Lachnum* species from the tropics recorded recently by Cantrell and Haines (1997) were also compared, *L. hainanesis* differs mainly from them in sizes of asci and ascospores and the iodine reation of ascus pore walls.

* ***Lachnum javanicum*** (Henn. & E. Nyman) J. H. Hanies, Korf & W. Y. Zhuang
≡ *Erinella javanica* (Henn. & E. Nyman) Teng
On wood.
Korf & Zhuang (1985) provided a note on the fungus.

Lachnum singerianum (Dennis) W. Y. Zhuang & Zheng Wang, **comb. nov.**
≡ *Dasyscyphus singerianus* Dennis, Kew Bull. 13: 465, 1958.

Apothecia discoid, shortly stipitate, 0.4-1.1 mm in diameter when dry; margin incurved and hymenium whitish-yellow when dry; receptacle concolorous with hymenium. Hairs granulate, hyaline, septate, thick-walled, mostly 2.5-4.5 µm wide. Asci clavate, J+ in Melzer's reagent, 44-55 x 4.5-5.5 µm. Ascospores elongate-ellipsoid, biguttulate, non-septate, hyaline, irregularly biseriate, 7.0-10.0 x 1.8-2.5(-3.0) µm. Paraphyses cylindrical, with a somewhat pointed end, ca. 1.5 um wide.

On fern rachis, S. Lin LPJ 023 (HN 6), IV 1993, HMAS 71984; on fern rachis, S. Lin LPJ 024 (HN 14), IV 1993, HMAS 71992.

Lachnum singerianum was treated as one of the varieties of *Dasyscyphus fimbriifer* (Berk. & M. A. Curtis) Sacc. According to Haines (1980), *D. fimbriifer* var. *singerianus* (Dennis) Haines differs from *D. fimbriifer* var. *fimbriifer* in its ascospores being cylindrical with two large guttules as opposed to fusoid, 6-12 x 1.5-2.0 µm vs. (13-)15-28(-32) x 3.0-3.5(-3.7) µm in size, and asci 30-50 x 3.6-4.8 µm vs. 60-85 x 6-8 µm. The Chinese collections are identical with *D. fimbriifer* var. *singerianus*. The two varieties are too distinctive to be placed in the same species. We treat them at the specific level and transfer *D. singerianus* Dennis to the genus *Lachnum* Retz. As to the intermediate collections mentioned by Haines (1980), they may belong either to *Lachnum fimbriifer* (Berk. & M. A. Curtis) J. H. Haines (1992) or to *L. singerianum*.

* ***Lagerheimia carteri*** (Berk.) Sacc.
On decaying decorticated wood.

* ***Lamprospora polytrichina*** (Rehm) Seaver
On soil among mosses.

* ***Lanzia serotina*** (Pers.) Korf & W. Y. Zhuang
≡ *Helotium serotinum* (Pers.) Fr.
On fallen twigs in woods.

According to Teng's description (1963, 1996), the spore size and shape are very similar to those of *Ciboria peckiana* (Cooke) Korf.

* ***Leotia marcida*** Pers.
on ground in woods.

* ***Microstoma floccosum*** (Schwein.) Raitv.
= *Sarcoscypha floccosa* (Schwein.) Sacc.

Mollisia **sp.**

Apothecia discoid, sessile, 1-2 mm when dry. Ectal excipulum of textura angularis, ca. 30 µm thick; cells 4-9 µm in diam, walls light brown. Medullary excipulum of textura intricata, ca 40 um thick; hyphae light to pale brown, ca. 2 µm wide. Hymenium 55-60 µm thick. Asci 8-spored, J+ in Melzer's reagent, pore walls strongly blue, ca. 55 x 4.5-5.0 µm. Ascospores elongate-ellipsoid, irregularly uniseriate to biseriate, 5.5-7.5 x 1.2-1.5 µm. Paraphyses cylindrical, 1.5 µm wide.

On hard wood, Tan-hsien, S. Q. Deng, 3 XII 1934, HMAS 9666.

The ascospores of this collection are narrower than *Mollisia cinerea* (Berk.) P. Karst. and apothecia larger (Dennis, 1978). We do not have a suitable name for it.

* ***Myriodiscus sparassoides*** Boedijn
= *Ascotremellopsis bambusicola* Teng & S. H. Ou
On node of bamboo culm.

Orbilia cf. ***fimicola*** Jeng & Krug

Diagnostic features: Apothecia discoid, 0.2-1.0 mm in diameter when dry; hymenium brownish-yellow and translucent when dry. Ectal excipulum of textura angularis, cells 5-12 x 5-17 µm. Medullary excipulum of textura intricata to textura angularis. Hymenium 28-30 µm thick. Asci 8-spored, J-, walls not blue in Melzer's reagent, 23-30 x 3.5-4.0 µm. Ascospores clavate and slightly curved, with one side enlarged, one side strongly narrow and pointed at apex, irregularly 4-seriate, 6.0-8.5 x 1.0-1.4 µm. Paraphyses capitate at apex, 2-3 µm wide at apex and 1.7 µm below.

On rotten bark, S. Lin LPJ 014 (HN 2), IV 1993, HMAS 71980.

After comparing our fungus with species which have similar spore shape, *Orbilia auricolor* (Bloxam ex Berk. & Broome) Sacc. (Spooner, 1987; Korf, 1992), *O. comma* Gradden (1977), *O. fimicola* (Jeng & Krug, 1977; Pfister, 1994), and *O. terrestris* Raitviir & Faizova (1983), we found that *O. fimicola* is the closest species morphologically. We notice that substrate of the Chinese collection is entirely different from that of *O. fimicola* but its morphology is very much similar.

Orbilia inflatula (P. Karst.) P. Karst.

On rotten bark, S. Lin LPJ 022 (HN 10), IV 1993, HMAS 71988.

Treatment of Spooner (1987) is followed. The asci of the Chinese collection are 22-27 x 3.0-4.5 µm and its ascospores are tetraseriate and 5.5-7.0 x 0.6-0.9 µm.

Phillipsia carnicolor Le Gal

On rotten wood, Qiongzhong, J.-H. Yu & R. Liu, 15 IX 1960, HMAS 28976.

* ***Phillipsia domingensis*** Berk.

On dead wood.

* ***Plectania campylospora*** (Berk.) Nannf.

≡ *Urnula campylospora* (Berk.) Cooke

On rotten wood, Ledong County, alt. 900m, M. Zang 11689, 15 XII 1989, HKAS 22251, HMAS 72017.

* ***Plectania melastoma*** (J. C. Sowerby) Fuckel

≡ *Urnula melastoma* (J. C. Sowerby) Boud.

On decayed wood.

* ***Psilopezia aquatica*** (DC.) Rehm

On water-soaked, putrid wood.

* ***Rutstroemia conformata*** (P. Karst.) Nannf.

≡ *Helotium conformatum* Karst.

On decaying leaves in woods.

* ***Sarcoscypha occidentalis*** (Schwein.) Sacc.

On fallen twigs partially buried among leaf-mold.

* ***Scutellinia scutellata*** (L.) Lamb.

On soil, rotten wood or decaying plant materials.

* ***Scutellinia crinita*** (Bull.) Lamb.

= *Scutellinia fimetaria* (Seaver) Teng

On cow dung.

* ***Trichoglossum durandii*** Teng

* ***Trichoglossum farlowii*** (Cooke) Durand var. ***rotundiforme*** (Kawamura) Teng

* ***Trichoglossum hirsutum*** (Pers.) Boud. var. ***capitatum*** (Pers.) Boud.

It has no distinction from *Trichoglossum hirsutum* var. *hirsutum* and differs only in shape of fruitbody. We doubt its status at variety level. The specimen was not cited by Teng (1963, 1996).

Trichoglossum hirsutum var. ***latisporum*** W. Y. Zhuang

On the ground, Diaoluoshan, J.-C. Xing, 29 IX 1958, HMAS 27762.

* ***Tympanis hainanensis*** S. H. Ou

On decaying bark or wood.

Unguiculariopsis hysterigena (Berk. & Broome) Korf

On hymenium of *Rhytidhysteron rufulum*, Lingshui, X.-K. Deng, 3 IV 1934, CUP-CH 259, HMAS 45100; 31 X 1934, HMAS 53795; 1934, HMAS 53796.

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摘要: 本文对保存在中国科学院微生物研究所菌物标本馆中的海南岛盘菌标本进行了分类研究，鉴定出 15 属 23 种及 1 变种，其中海南粒毛盘菌 *Lachnum hainanense* 为新种，辛格粒毛盘菌 *Lachnum singerianus* 为新组合， *Lachnum singerianus* 和 粪生圆盘菌 *Orbilia* cf. *fimicola* 为我国新记录。连同邓叔群的早期报道，本文记载海南岛已知盘菌 54 个分类单元。

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THE GENUS *MICROBOTRYUM* (SMUT FUNGI) *

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ABSTRACT

The genus *Microbotryum* is revised. After a short historical review and discussion of taxonomic and nomenclatural problems and delimitation of this genus, it is demonstrated that, i.a., typical for *Microbotryum* are the violet tint of the spores and the host plant range restricted to dicotyledonous genera. In addition to the 17 described *Microbotryum* species, further 55 *Ustilago* species are proposed to be placed into this genus, using a simple "colour contrast" method. These species are: On Caryophyllaceae: *M. arenariae-bryophyllae*, *M. duriaeanum*, *M. holostei*, *M. jehudanum*, *M. moehringiae*, *M. moenchiae-manticae*, *M. nivale*. On Compositae: *M. cardui*, *M. cichorii*, *M. onopordi*, *M. scolymi*. On Dipsacaceae: *M. cephalariae*, *M. flosculorum*, *M. intermedium*, *M. morinae*. On Gentianaceae: *M. nannfeldtii*. On Lentibulariaceae: *M. pinguiculae*. On Onagraceae: *M. gayophyti*. On Polygonaceae: *M. ahmadianum*, *M. anomalum*, *M. aviculare*, *M. bistortarum*, *M. bosniacum*, *M. cilinode*, *M. coronatum*, *M. dehiscens*, *M. dumosum*, *M. filamenticola*, *M. goeppertianum*, *M. himalense*, *M. koenigiae*, *M. kuehneanum*, *M. longisetum*, *M. marginale*, *M. nepalense*, *M. ocrearum*, *M. parlatorei*, *M. picaceum*, *M. piperii*, *M. polygoni-alati*, *M. prostratum*, *M. radians*, *M. rhei*, *M. shastense*, *M. stewartii*, *M. stygium*, *M. tenuisporum*, *M. tovarae*, *M. tuberculiforme*, *M. tumeforme*, *M. warmingii*. On Portulacaceae: *M. calandriniae*, *M. calandriniicola*, *M. claytoniae*, *M. nelsonianum*.

A diagnosis of the reconsidered genus and a key to the recognised 72 species of *Microbotryum* are given. The validity and the authorship of the names of *M. stellariae* and *M. scabiosae* are discussed. Lectotypes are designated for *M. claytoniae* and *M. stellariae*.

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INTRODUCTION

Léveillé (1847:372) proposed the genus *Microbotryum* Lév., giving for it the following description: "Réceptacle composé de filaments rameux; ramifications renflées au sommet, et supportant 8–20 spores; spores sphériques". Léveillé mentioned three species under his new genus but without indicating the type: "*Ustilago antherarum* Lév., *U. receptaculorum* Lév., *U. montagnei* Tul." These species actually are: **1**. *Microbotryum antherarum* (DC.) Lév., based on *Uredo antherarum* de Candolle (1815:79), a nomen novum illeg. superfluum for *Uredo violacea* Pers.: Pers. (1801), consequently an illegitimate name, **2**. *M. receptaculorum* (DC.) Lév., based on *Uredo receptaculorum* DC. (1808:228), and **3**. *M. montagnei* (L.-R. & C. Tul.) Lév., based on *Ustilago montagnei* L.-R. & C. Tulasne (1847:88), type on *Schoenus* sp. [= *S. laxus* Poiret = *Rhynchospora glauca* Vahl <comp. Lindeberg, 1959:124> = Rhynchospora rugosa (Vahl) S. Gale].

The name *Microbotryum* was neglected for a long time. Deml & Oberwinkler (1982b:353) reintroduced this name for some anthericolous smuts of Caryophyllaceae. They provided an emended description for it, as type they designated "*Microbotryum antherarum* Lév.", and transferred six species into this genus: *M. violaceum*, *M. lychnidis-dioicae* (as '*lynchis-dioicae*'), *M. majus* (as '*major*'), *M. silenes-inflatae*, *M. stellariae* and *M. violaceo-irregulare*.

Blanz & Gottschalk (1984) used molecular biological methods and compared 5S rRNA nucleotide sequences of different basidiomycetous fungi. They demonstrated that "The smuts parasitising dicots represent a group different from the graminicolous one", and these "cannot be kept in the order Ustilaginales any longer". This work started to prove scientifically the ingenious visions of Savile (1953:667) and Nannfeldt (in Lindeberg, 1959:150) who considered the purple-spored *Ustilago* species as forming a natural group. Nannfeldt also wrote that "No species on Gramineae or on any other monocotyledonous host falls into this group."

The opinion that the anthericolous smut fungi of the Caryophyllaceae have to be taken out from the large, heterogeneous *Ustilago* as *Microbotryum* was generally accepted and followed (H. & I. Scholz, 1988, Vánky, 1988, 1994, and others) and further smut fungi have been transferred into this genus (*M. dianthorum*, *M. violaceo-verrucosum*).

Deml & Prillinger (in Prillinger et al., 1991) gave a complex and emended characterisation of *Microbotryum*, based on biochemical (neutral sugars pattern of purified cell walls, urease-activity, diazonium blue B reaction on the production of extracellular amyloid compounds, fermentation of carbohydrates, ubiquinone), on germination and also on molecular biological data (of 5S rRNA analyses of Blanz & Gottschalk, 1984). They transferred further four species into *Microbotryum*, two on Polygonaceae (*M. cordae*, *M. vinosum*), one on Dipsacaceae (*M. scabiosae*) and one on Compositae (*M. scorzonerae*). The great progress in this paper is, that the host plant range of *Microbotryum* was extended beyond the Caryophyllaceae also to other families.

Bauer and Oberwinkler (in Bauer et al., 1997) transferred further five *Ustilago* species into the genus *Microbotryum* (*M. betonicae*, *M. pustulatum*, *M.*

reticulatum, *M. succisae*, *M. tragopogonis-pratensis*), based on ultrastructural studies, extending the host plant range also to a species on Labiatae.

Moore (1992) proposed the new genus *Bauhinus* R. T. Moore (type *Uredo tragopogonis-pratensis*) for all *Ustilago* species of dicotyledonous plants, based, i.a., on the papers of Blanz & Gottschalk (1984) and Deml (in Hoog de, et al., eds., 1987). Vánky (1993:41) demonstrated that this name is a nomen novum superfluum for *Microbotryum* Lév.

Moore (1996:17-20) discussed the genus *Microbotryum*, its delimitation, as well as several nomenclatural problems and mistakes by different authors in connection with this genus. He proposed a new family, Microbotryaceae R. T. Moore with two genera: *Bauhinus* R. T. Moore (on Polygonaceae, Dipsacaceae and Compositae), and *Microbotryum* Lév. (on Caryophyllaceae). These two genera were based on supposed differences of the basidial morphology. Bauer & Oberwinkler (1997:312-313) and Bauer et al. (1997) demonstrated that the differences of the basidia used by Moore in support of the existence of these two genera within the Microbotryaceae, are not stable, and are useless.

Bauer & Oberwinkler (in Bauer et al., 1997) proposed a completely new, more natural classification of the smut fungi and allied taxa, based mainly on ultrastructural studies. In this classification a new order, Microbotryales R. Bauer & Oberw. is proposed, with the following description: "Phytoparasitic members of the Basidiomycota having transversely septate basidia with multiple production of sessile basidiospores and only intercellular hyphae". The Microbotryales comprise two families: 1. Microbotryaceae R. T. Moore (type *Microbotryum* Lév.), with "Members of the Microbotryales having poreless septa at maturity", on dicotyledonous host plants, and 2. Ustilentylomataceae R. Bauer & Oberw., with "Members of the Microbotryales having simple septal pores", on monocotyledonous host plants. The Microbotryaceae comprise four genera: *Microbotryum* Lév., *Liroa* Cif., *Sphacelotheca* de Bary, and *Zundeliomyces* K. Vánky. The Ustilentylomataceae include three genera: *Aurantiosporium* M. Piepenbr., K. Vánky & Oberw., *Fulvisporium* K. Vánky, and *Ustilentyloma* Savile.

Begerow et al. (1998, in press) placed the Ord. Microbotryales, together with, i.a., Ord. Uredinales into the Cl. Uredinomycetes, based on studies of nuclear LSU rDNA sequences of smut fungi and related taxa.

Until now 17 *Microbotryum* species have been recognised: eight on Caryophyllaceae [*M. dianthorum* (Liro) H. & I. Scholz, *M. lychnidis-dioicae* (DC. ex Liro) G. Deml & Oberw., *M. majus* (Schröter) G. Deml & Oberw., *M. silenes-inflatae* (DC. ex Liro) G. Deml & Oberw., *M. stellariae* (Liro) G. Deml & Oberw., *M. violaceo-irregulare* (Brandenb. & Schwinn) G. Deml & Oberw., *M. violaceo-verrucosum* (Brandenb. & Schwinn) K. Vánky, and *M. violaceum* (Pers.: Pers.) G. Deml & Oberw.], two on Compositae [*M. scorzonerae* (Albertini & Schwein.) G. Deml & Prill., and *M. tragopogonis-pratensis* (Pers.) R. Bauer & Oberw.], two on Dipsacaceae [*M. scabiosae* K. Vánky, and *M. succisae* (Magnus) R. Bauer & Oberw.], one on Labiatae [*M. betonicae* (G. Beck) R. Bauer & Oberw.], and four on Polygonaceae [*M. cordae* (Liro) G. Deml & Prill., *M. pustulatum* (DC.) R. Bauer & Oberw., *M. reticulatum* (Liro) R. Bauer & Oberw., and *M. vinosum* (L.-R. & C. Tul.) Denchev].

MATERIALS AND METHODS

In addition to the methods, described, i.a., in Vánky (1985:4, 1994:8) and Vánky & Oberwinkler (1994:4), a new, "colour contrast" method was applied for showing even very pale violet tint of the spores, typical for species of *Microbotryum*. Spores of the suspected *Microbotryum* species and those of a typically brown, smooth-spored smut fungus, *Ustilago hordei* (Pers.: Pers.) Lagerh. were mixed in a droplet of lactophenol on a slide, covered by a cover glass and studied under a light microscope at 1000x magnification. A comparison of the colours of the two kinds of spores side by side easily revealed even a pale violet tint.

RESULTS AND DISCUSSIONS

The biochemical analyses (comp. Deml & Oberwinkler, 1982a, Prillinger et al, 1990a, b, 1991, 1993), the ultrastructural characters (comp. Bauer et al., 1997) and the molecular biological data (comp. Blanz & Gottschalk, 1984, Begerow et al., 1998), all are supporting Savile (1953:667) and Nannfeldt (in Lindeberg, 1959:150) who considered the purple-spored *Ustilago* species of dicotyledonous host plants to be a natural group for which we now have the name *Microbotryum*.

In order to detect further *Microbotryum* species, I selected the 66 recognised *Ustilago* species on different dicotyledonous host plants. I checked the spore colour of these species and I found that additional 55 smut fungus species have to be recombined into the genus *Microbotryum*. In a few cases I was unable to detect the violet tint of the spores, even by using the "colour-contrast" method described above. These species will be investigated by other methods (ultrastructure, molecular biology) in order to elucidate their generic position. For the species for which new combinations are proposed, nomenclatural and taxonomic synonyms are enumerated, and for those which are not treated in Vánky (1994) and Vánky & Oberwinkler (1994), also detailed descriptions are given. (For complete literature list of the synonyms see also these two papers).

Taxonomic and nomenclatural problems of *Microbotryum*.

The first problem, discussed also by Deml & Oberwinkler (1982b:352), is the generic name *Microbotryum* Léveillé (1847) versus *Farinaria* Sowerby. Sowerby, in his "Coloured figures of English fungi or mushrooms" (1796–1803), published at least twelve *Farinaria* species, among them two, *F. stellariae* Sow. and *F. scabiosae* Sow. (Table 396, figs. 1 and 2, respectively, 1803) which belong to *Microbotryum*. Deml & Oberwinkler (l. c.) considered "the first species" of *Farinaria* described by Sowerby, *F. seminaria* Sow. (Table 360, fig. 1, 1802), to be the type of the genus. This fungus being placed into synonymy with *Oidium erysiphoides* by Fries (1832), they concluded that "Therefore Ainsworth's statement (1963) '*Farinaria* = *Ustilago* sensu Fries 1832' cannot be accepted, and *Farinaria* cannot be used as generic name for smut fungi". This consideration, however, is contrary to the recommendation of the International Code of Botanical Nomenclature (ICBN 9.A.2): "Mechanical methods, such as the automatic selection of the first species or specimens cited . . . . . , should be avoided as unscientific and productive of possible future confusion and further changes"]. The next questions are whether *Farinaria* was validly and effectively published by Sowerby or not. If yes, was a type designated for it or not? No description of the genus *Farinaria* was given by Sowerby, and it is also not mentioned in the Index nominum genericorum plantarum (Farr et al., 1979 & 1986). This means that the name *Farinaria* is a nomen nudum and cannot be taken into consideration as an alternative for the generic name of *Microbotryum*, and no recombination of the 17 *Microbotryum* names will be necessary into this genus. It also means that the authorship of *Farinaria stellariae* Sow. and *F. scabiosae* Sow. (and all combinations based on these names) have to be revised.

Another problem, discussed also by Moore (1996:17-20) is the type of *Microbotryum*. Deml & Oberwinkler (1982b:353) designated as "Type species: *Microbotryum antherarum* Lév. Basionym: *Ustilago antherarum* Fries". This species is actually *Microbotryum antherarum* (DC.) Lév., based on *Uredo antherarum* de Candolle (1815:79), a nomen novum illeg. superfluum for *Uredo violacea* Pers.: Pers. (1801:225), consequently an illegitimate name. But because de Candolle (1815:79), in connection with his *Uredo antherarum*, made a direct reference to Persoon's *Uredo violacea* Pers., 1801:225 (= *Microbotryum violaceum* (Pers.: Pers.) G. Deml & Oberw.) this name has to be accepted as the type of *Microbotryum*, with its type specimen on *Silene nutans* L., not on *Saponaria officinalis* L., as given by Liro, 1924:30 & 280, and Deml & Oberwinkler, 1982b:352. [For comments on the type see Nannfeldt, in Lindeberg, 1959:142.; Comp. also ICBN §9.13, 9.A.2, and §10.5].

In connection with *Microbotryum vinosum* (L.-R. & C. Tul.) G. Deml & Prill. (in Prillinger & al., 1991:10), Denchev (1994:331) demonstrated that the new combination is illegitimate (ICBN §33.2) and he proposed the name *M. vinosum* (L.-R. & C. Tul.) Denchev.

Guo (1996), based on molecular biological studies, concluded that *Ustilago bungeana* W. Y. Yen, on *Polygonum bungeanum* Turcz. (treated by Vánky & Oberwinkler, 1994, as a separate species) is very close to and synonymous with *Ustilago cordae* Liro (= *Microbotryum cordae* (Liro) G. Deml & Prill.).

Characterisation and systematic position of *Microbotryum.*

Little is known about the chemistry of smut fungi. Deml (1985, 1987), Deml & Oberwinkler (1980, 1982a, b), Deml et al. (1984) studied siderochrome formation of some phragmobasidial smut fungi. They found that the studied species of dicotyledonous host plants produce rhodotorulic acid, while those of monocotyledonous plants produce siderochrome of ferrichrome-type. Prillinger et al. (1990a, 1990b, 1991, 1993) studied the neutral sugar pattern of purified cell walls, urease-activity, diazonium blue B reaction, production of extracellular amyloid compounds, fermentation of carbohydrates, and ubiquinone data of different groups of fungi, among them also a number of smut fungi. They found that in the "*Microbotryum* group" the main component of the cell-wall-carbohydrate is mannose, accompanying component is fucose, xylose is lacking, urease and diazonium blue B tests are positive, and there is no production of extracellular amyloid. To their "*Microbotryum* group", beside 7 *Microbotryum* and 2 *Sphacelotheca* species, also belong *Leucosporidium, Rhodosporidium, Rhodotorula, Sporobolomyces, Sporidiobolus, Septobasidium, Agaricostilbum* and *Platygloea* species.

Regarding the violet colour of the spores, it is also present in other genera of the Microbotryaceae, e.g., in all (five) recognised species of *Sphacelotheca* de Bary (on Polygonaceae) and in the monotypic *Liroa* Cif. (*L. emodensis* (Berk.) Cif., on *Polygonum chinense* L.), but it is (apparently) absent in the very pale *Zundeliomyces polygoni* K. Vánky (on *Polygonum alpinum* All.). It is also absent in two species of *Microbotryum*, *M. scabiosae* K. Vánky and *M. succisae* (Magnus) R. Bauer & Oberw. (on Dipsacaceae). However, in all species of the Microbotryaceae, including the few very pale ones, the host–parasite interaction and the ultrastructure are identical, namely only intercellular hyphae are present, and mature septa are poreless.

The most important differentiating characters of the families and genera of the order Microbotryales are:

1. Mature septa poreless. Spores violet. On dicots .... Microbotryaceae (2)
– Septa with simple pore. Spores yellow. On monocots ... Ustilentylomataceae (5)
2. Spores of two types .... *Zundeliomyces*
– Spores of the same type 3
3. Peridium and columella in the sori present. Spores at first catenulate, joined by disjunctors .... *Sphacelotheca*
– Peridium and columella absent. Spores not catenulate 4
4. Spores produced in lunate cavities and mixed with filaments .... *Liroa*
– Spores not so .... *Microbotryum*
5. Sori as parenchymatous galls in the spikelets of Cyperaceae, filled with orange-yellow mass of agglutinated groups of spores .... *Aurantiosporium*
– Sori otherwise, on Gramineae 6
6. Sori as leaf-spots. Spores embedded in the host tissue, single or in groups, not forming spore balls .... *Ustilentyloma*
– Sori in the stems in which spore balls are produced .... *Fulvisporium*

Begerow et al. (1998, in press) placed the Ord. Microbotryales into the Cl. Uredinomycetes, based on a statistically and mathematically calculated resemblance of base sequences of one fragment of certain chromosomes of the analysed taxa. For me it is difficult to accept this arrangement in which important aspects such as life cycle, spore generations, teliospore polymorphism, spore and basidial morphology, host range and host alternations, etc., are not taken into consideration, aspects in which there are essential differences between the rust fungi and the members of the Microbotryales. On the other hand, in all these characters, except the analysed LSU rDNA sequences, and maybe a few other characters (e.g. cell wall sugar content), members of the Microbotryales stand much closer to the Ustilaginomycetes than to the Uredinomycetes, even if the Uredinomycetes sensu Begerow et al. are a big assemblage of plant- and mycoparasitic as well as other fungi. To accept this arrangement of the Microbotryales it is necessary to suppose and accept that all characters which the Microbotryales have in common with the classical smut fungi appeared twice, independently, as a result of convergent evolution.

MICROBOTRYUM J. H. Léveillé, 1847:372, emend. G. Deml & Oberwinkler, 1982b:353, emend. G. Deml & Prillinger (in Prillinger et al., 1991), emend. K. Vánky.

Sori in various organs of the host plants belonging to different dicotyledonous host families. Spore mass dusty, light to dark purplish-brown (rarely nearly colourless). *Spores* single, pale to dark violet-brown; surface variously sculptured (often reticulate, but also echinulate, verrucose, striate or cerebriform). Peridium around, and columella and capillitium-like threads in the sori are lacking. Sterile cells between the spores and catenulation of the spores absent. *Germination* results in phragmobasidia with successive production of sessile basidiospores, without sterigmata. Host–parasite interaction by intercellular hyphae. Mature septa are poreless. Typus generis: *Microbotryum antherarum* [DC.] Lév. = *Microbotryum violaceum* (Pers.: Pers.) G. Deml & Oberw.

New combinations proposed.

Microbotryum ahmadianum (H. Sydow) K. Vánky, **comb. nov.**
Basionym: *Ustilago ahmadiana* H. Sydow, Ann. Mycol. 36:437, 1938. – Type on *Polygonum rumicifolium* Royle, India, Himachal Pradesh, Mt. Himalaya, Rotang Pass, coll. S. Ahmad (HCIO 10115!).

On Polygonaceae: *Polygonum* (Sect. Aconogonon) *rumicifolium* Royle; C. Asia.

Microbotryum anomalum (J. Kunze ex Winter) K. Vánky, **comb. nov.**
Basionym: *Ustilago anomala* J. Kunze ex Winter, Die Pilze Deutschlands, Oesterreichs und der Schweiz, p. 100, 1881. – *Ustilago anomala* J. Kunze, in Kunze, Fgi. sel. exs. No. 23, 1875 (nomen nudum). – Type on *Polygonum dumetorum* L. (= *Bilderdykia dumetorum*), Germany, Sachsen, Eisleben, Unterrissdorf, Kesselhölzchen, VIII.1875, J. Kunze; isotypes in Kunze, Fgi. sel. exs. No. 23 (HUV 3226!).

Ustilago pallida Schröter, in Fischer von Waldheim, 1877:30 (May); in Cohn, 1877:355 (after June); non *Ustilago pallida* Körnicke, 1877:34 (March), nec *Ustilago pallida* Lagerh. ex Bubák, 1912, q.e. *Microbotryum silenes-inflatae*. – Lectotype on *Polygonum* (designated by Lindeberg, 1959:107) *dumetorum* L. (= *Bilderdykia dumetorum*), Germany, Baden, Rastatt, III.1876, J. Schröter.

Ustilago carnea Liro, 1921:27. – *Ustilago anomala* J. Kunze ex Winter var. *carnea* (Liro) Hirschhorn, 1947:78. – Lectotype on *Polygonum convolvulus* L. (= *Bilderdykia convolvulus*), (designated by Lindeberg, 1959:108) Sweden, Stockholm, VIII.1884, J. Eriksson; isolectotypes in Eriksson, Fgi. paras. scand. No. 155 (HUV 9862!).

Ustilago raciborskiana Siemaszko & Wróblewski, in Siemaszko, 1933:143. – Type on *Polygonum aubertii* Louis Henry (= *Bilderdykia aubertii*), Poland, Poznan Distr., Kórnik, X.1932, A. Wróblewski (HUV 5986!).

On Polygonaceae: *Bilderdykia aubertii* (Louis Henry) Moldenke (*Polygonum aubertii* Louis Henry; *P. baldschuanicum* auct., non Regel), *B. baldschuanica* (Regel) D. A. Webb (*Polygonum baldschuanicum* Regel), *B. convolvulus* (L.) Dumort. (*Polygonum convolvulus* L.), *B. dumetorum* (L.) Dumort. (*Polygonum dumetorum* L.); World-wide.

Microbotryum arenariae-bryophyllae (K. Vánky) K. Vánky, **comb. nov.**
Basionym: *Ustilago arenariae-bryophyllae* K. Vánky, Mycotaxon 18:333, 1983. – Type on *Arenaria bryophylla* Fernald, India, Jelep La pass, alt. c. 4760 m, IX.1938, coll. unknown, comm. S. Ahmad (HUV 9045!).

Sori in the capsules transforming the seeds into a purplish-black, first agglutinated, later powdery spore mass. *Spores* globose, subglobose, ovoid to subpolyhedrally irregular, 12–17.5 x 13.5–24 µm, medium to dark purplish-brown; wall 1–1.5 µm thick, in LM very finely foveolate-reticulate causing the spore profile to appear wavy to finely serrulate, in SEM finely, sometimes incompletely, verruculosely reticulate; the reticulum being composed of anastomosed, thin, 0.8–1 µm high warts.

On Caryophyllaceae (Subfam. Alsinoideae): *Arenaria bryophylla* Fernald (*A. musciformis* Wall. ex Edgew. & Hooker fil.); S. Asia.

Microbotryum aviculare (Liro) K. Vánky, **comb. nov.**
Basionym: *Ustilago avicularis* Liro, Ann. Acad. Sci. Fenn., Ser. A, 17:18, 1924. – *Ustilago anomala* J. Kunze ex Winter var. *avicularis* (Liro) B. Lindeberg, 1959:108. – Lectotype on *Polygonum heterophyllum* Lindman (= *P. aviculare*), (designated by Lindeberg, 1959:108) Finland, Nyland, Pornainen, Kirveskoski, Ruskeapää, 13.VIII.1916, T. Putkonen; isolectotypes in Mycoth. fenn. No. 341 (HUV 7710!).

On Polygonaceae: *Polygonum* (Sect. *Polygonum*) *aviculare* L., *P. raji* Bab.; Europe, Asia, N. America.

Microbotryum bistortarum (de Candolle) K. Vánky, **comb. nov.**
Basionym: *Uredo bistortarum* DC. [var.] *ustilaginea* de Candolle, Fl. franç. 6:76, 1815. – *Ustilago bistortarum* (DC.) F. Körnicke, 1877:38. – *Ustilago ustilaginea* (DC.) Liro, 1924:7. – *Sphacelotheca ustilaginea* (DC.) S. Ito, 1935:90. – *Sphacelotheca ustilaginea* (DC.) Ciferri, 1938:273 (later homonym). – *Ustilago bistortarum* (DC.) Körn. var. *ustilaginea* (DC.) B. Lindeberg, 1959:111. – Lectotype on *Polygonum* (designated by Lindeberg, 1959:111) *viviparum* L., France, A. P. de Candolle.

Ustilago candollei L.-R. &. C. Tulasne, 1847:93 (based on *Uredo bistortarum* DC. [var.] *ustilaginea* DC. "pro parte?"). – Type on *Polygonum bistorta* L., France, A. P. de Candolle.

Sphacelotheca hydropiperis (Schumacher) de Bary var. *borealis* G. P. Clinton, 1904:395. – *Sphacelotheca borealis* (G. P. Clinton) Schellenberg, 1907:386. – Type on *Polygonum bistortoides* Pursh, USA, Washington, Rainier Mt., VIII.1895, C. V. Piper (BPI 177282 & 177283!).

Ustilago bistortarum (DC.) Körn. [var.] *inflorescentiae* Trelease, in Saccardo, Peck & Trelease, in Harriman, 1904:35. – *Ustilago inflorescentiae* (Trel.) Maire, in Brockmann-Jerosch & Maire, 1907:273 (July/August). – *Sphacelotheca inflorescentiae* (Trel.) Jaap, 1908:194. – *Sphacelotheca inflorescentiae* (Trel.) Maire, 1907(1909):CXLIX (later homonym). – Lectotype on *Polygonum viviparum* L., Alaska, (designated by Lindeberg, 1959:112) Kodiak Isl., W. Trelease (675).

Sphacelotheca polygoni-vivipari Schellenberg, 1907:388 (Oct.). – Type on *Polygonum viviparum* L., Europe, the Alps, H. C. Schellenberg.

On Polygonaceae: *Polygonum* (Sect. *Bistorta*) *bistorta* L., *P. bistortoides* Pursh, *P. carneum* C. Koch, *P. viviparum* L.; Northern hemisphere.

Microbotryum bosniacum (G. Beck) K. Vánky, **comb. nov.**
Basionym: *Ustilago bosniaca* G. Beck, Ann. K. K. Naturhist. Hofmus. (Wien) 9:121, 1894. – *Sphacelotheca bosniaca* (G. Beck) R. Maire, 1907(1909):CL. – Type on *Polygonum alpinum* All., Yugoslavia, Bosnia, Vranica Planina Mts., Matorac Mt., alt. 1600–1900 m, VII, G. Beck; isotypes in Crypt. exs. Vindob. No. 8 (HUV 3398!).

Ustilago punctata G. P. Clinton, 1906:23. – Type on *Polygonum newberryi* Small, USA, Washington, Paddo Mt. [= Adams Mt.], alt. 2200 m, 6.IX.1904, W. N. Suksdorf (BPI 165490-165495!).

Sphacelotheca alpina Schellenberg, 1907:392. – Type on *Polygonum alpinum* All., Switzerland.

On *Polygonaceae: Polygonum* (Sect. *Aconogonon*) *alpinum* All. (*P. undulatum* Murray), *P. bucharicum* Grig., *P. coriarium* Grig., *P. laxmannii* Lepech, *P. newberryi* Small, *P. songoricum* Schrenk; Europe, Asia, N. America.

Microbotryum calandriniae (G. P. Clinton) K. Vánky, **comb. nov.**
Basionym: *Ustilago calandriniae* G. P. Clinton, Proc. Boston Soc. Nat. Hist. 31:378, 1904. – Type on *Calandrinia breweri* Watson, USA, California, Santa Barbara, 1886, W. G. Farlow (BPI 159493!).

Sori in the gynoeceum destroying the seeds and filling the capsules with a purplish-brown, dusty spore mass. *Spores* globose, subglobose, ovoid, more rarely elongated or irregular, 14.5–18.5(–20) x 15–20(–21) µm, violet tinted yellowish- to reddish-brown, reticulate, 4–8 rounded-polygonal meshes per spore diameter, in median view muri 2.5–4(–5) µm high, blunt.

On Portulacaceae: *Calandrinia breweri* Watson, *C. caulescens* H., B. & K., *C. menziensii* Torr. & Gray; N. America.

Microbotryum calandriniicola (Spegazzini) K. Vánky, **comb. nov.**
Basionym: *Ustilago calandriniicola* Spegazzini, Anales Mus. Nac. Buenos Aires, Ser. 3, 12:287, 1909. – Type on *Calandrinia affinis* Gill, Argentina, Neuquen, II.1901, C. Spegazzini (LPS 3140!).

Sori in the anthers, rarely in the ovaries, filling them with a violet-brown, dusty spore mass. *Spores* globose, subglobose to broadly ellipsoidal, 5–7 x (5–)6–8 µm, pale violet-brown, minutely reticulate, (3–)4–7(–8) subpolygonal meshes per spore diameter, muri c. 0.5 µm high, blunt.

On Portulacaceae: *Calandrinia affinis* Gill, *C. colchaguensis* Barn.; S. America.

Microbotryum cardui (Fischer von Waldheim) K. Vánky, **comb. nov.**
Basionym: *Ustilago cardui* Fischer von Waldheim, Bull. Soc. Imp. Naturalistes Moscou 40:255, 1867.

Ustilago reessiana Kühn, in Rabenhorst, Fgi. eur. Nos. 1798 & 1799, 1874; 1874:58 (nomen novum superfluum for *U. cardui*). – Lectotype on *Carduus acanthoides*, Germany, (designated by Vánky, 1985:200) Sachsen, near Halle a/S., 1863, M. Reess (HUV 3527!); isolectotypes in Rbh., Fgi. eur. No. 1799 (as *U. reessiana*).

On Compositae (Subfam. Asteroideae): *Carduus acanthoides* L., *C. crispus* L., *C. defloratus* L., *C. kerneri* Simonkai, *C. nutans* L., *C. personata* (L.) Jacq., *Cirsium ulmeticum* Sennen, *Silybum marianum* (L.) Gaertner; Europe, Asia.

Microbotryum cephalariae (K. Vánky) K. Vánky, **comb. nov.**

Basionym: *Ustilago cephalariae* K. Vánky, Mycotaxon 18:334, 1983. – Type on *Cephalaria humilis* (Thünb.) Roem. & Schult. (det. M. Welman 8541), South Africa, Lesotho, Butha-Bute Distr., Oxbow Tourist Lodge, alt. 2460 m, 26.I.1982, O. Hedberg (HUV 10980!).

On Dipsacaceae: *Cephalaria humilis* (Thünb.) Roem. & Schult.; S. Africa.

Microbotryum cichorii (H. Sydow) K. Vánky, **comb. nov.**

Basionym: *Ustilago cichorii* H. Sydow, Ann. Mycol. 27:413, 1929. – Type on *Cichorium intybus* L., Germany, Pommern, Rügen Island, near Philippshagen, "Nordseite des Reddevitzer Höftes", 20.VIII.1928, O. Bürgener, and 27.VII.1929, O. Bürgener & H. Sydow; isotypes in Sydow, Mycoth. germ. No. 2503 (HUV 3544!).

On Compositae (Subfam. Cichorioideae): *Cichorium intybus* L.; Europe, Asia.

Microbotryum cilinode (Savile) K. Vánky, **comb. nov.**

Basionym: *Ustilago cilinodis* Savile, Canad. J. Bot. 31:670, 1953. – Type on *Polygonum cilinode* Michaux (= *Bilderdykia cilinodis*), USA, New York, Liberty, 15.VII.1890, B. D. Halsted; isotypes in Seymour & Earle, Econ. fgi. No. 364 (HUV 13583!).

On Polygonaceae: *Bilderdykia cilinodis* (Michaux) (= *Polygonum cilinode* Michaux); N. America.

Microbotryum claytoniae (C. L. Shear) K. Vánky, **comb. nov.**

Basionym: *Ustilago claytoniae* C. L. Shear, Bull. Torrey Bot. Club 34:317, 1907. – Lectotype on *Claytonia linearis* Dougl., USA, Washington, Clarc Co., Vancouver Barracks, 8.IV.1903, T. E. Wilcox (designated here: BPI 188532!).

Sori in the seeds surrounding their lenticular, c. 1 mm long remains with a purplish-black, agglutinated to powdery mass of spores. *Spores* globose, subglobose to ellipsoidal, (12–)13–15(–17) x 13–16(–19) µm, light purplish brown; wall even, 1.5–2.5(–3) µm thick, reticulate, 6–10 rounded meshes per spore diameter, muri 1–2(–2.5) µm high, in median view with blunt edges.

On Portulacaceae: *Claytonia acutifolia* Pall. ex Schult., *C. linearis* Dougl. (*Montia linearis* (Dougl.) Greene), *C. perfoliata* Donn; N. America, E. Asia.

Microbotryum coronatum (Liro) K. Vánky, **comb. nov.**

Basionym: *Ustilago coronata* Liro, Ann. Acad. Sci. Fenn., Ser. A, 17:244, 1924. – Lectotype on *Rumex britannica* L. (= *R. orbiculatus* Gray), USA, (designated by Vánky & Oberwinkler, 1994:45) Missouri, Emma Saline Co, 25.VII.1894, C. H. Demetrio (HUV 9119!); isotypes in Sydow, Ust. No. 112 (as *Ustilago parlatorei*; HUV 4320!). Syntypes on *Rumex britannica*, USA, Nebrasca, Lincoln, V.1889, H. J. Webber, in Ellis & Ev., N. Amer. fgi. No. 2701 (as *Ustilago parlatorei*). USA, Missouri, Emma, 1893, C. H. Demetrio, in Rbh., Fgi. eur. No. 4009 (as *Ustilago parlatorei*).

On Polygonaceae: *Rumex* (Subgen. *Rumex*) *orbiculatus* Gray (= *R. britannica* L., nomen confusum); N. America.

Microbotryum dehiscens (L. Ling) K. Vánky, **comb. nov.**
Basionym: *Ustilago dehiscens* L. Ling, Sydowia 3:124, 1949. – Type on *Polygonum amplexicaule* D. Don, India, Kashmir, c. 10,000 ft, 23.VIII.1921, R. Stewart (6758; BPI 160174!).

On Polygonaceae: *Polygonum* (Sect. *Bistorta*) *amplexicaule* D. Don, *P. viviparum* L.; S.E. Asia.

Microbotryum dumosum (K. Vánky & Oberwinkler) K. Vánky, **comb. nov.**
Basionym: *Ustilago dumosa* K. Vánky & Oberwinkler, in Vánky, Mycotaxon 36:477, 1990. – Type on *Rumex dumosus* A. Cunn. ex Meisn., Australia, New South Wales, Moree, 30.X.1961, F. W. Cutting (HUV 6663!; isotypes BRIP 11845!, DAR 8533).

On Polygonaceae: *Rumex* (Subgen. *Rumex*) *dumosus* A. Cunn. ex Meisn.; Australia.

Microbotryum duriaeanum (L.-R. & C. Tulasne) K. Vánky, **comb. nov.**
Basionym: *Ustilago duriaeana* L.-R. & C. Tulasne, Ann. Sci. Nat. Bot., Sér. 3, 7:105, 1847. – Type on *Cerastium glomeratum* Thuill., Algeria, Tlemcen, 30.V.1842, coll. R. C. Durieu de Maisonneuve (PC).

Ustilago ducellieri R. Maire, 1917:140. – Type on *Arenaria serpyllifolia*, Algeria, "dunes de Maison-Carrée", 10.III.1912, L. Ducellier (Herb. Maire 560, MPU!).

Ustilago lepyrodiclidis Schwarzman, 1960:150. – Type on *Lepyrodiclis stellarioides* (Willd. ex Schlecht.) Fisch. & Mey. (= *Arenaria stellarioides* Willd. ex Schlecht.), Kazakhstan, Boroldai-tau Mt., at the village Vannovka, 30.V.1947, B. A. Bykov (AA; n. v.). Karatygin & Azbukina (1989:117) consider it to be *U. ducellieri*. I. V. Karatygin (pers. comm.), who checked the type specimen, found the spore measurements given by Schwarzman to be erroneous.

On Caryophyllaceae (Subfam. Alsinoideae): *Arenaria*, *Cerastium*, ?*Moehringia* and ?*Stellaria* spp.; Europe, Asia, N. Africa, N. America.

Microbotryum filamenticola (L. Ling) K. Vánky, **comb. nov.**
Basionym: *Ustilago filamenticola* L. Ling, Mycol. Pap. 11:5, 1945. – Type on *Polygonum japonicum* Meisn., China, Szechwan Prov., Chengtu, 9.II.1940, L. Ling (BPI 160426!).

On Polygonaceae: *Polygonum* (Sect. *Persicaria*) *japonicum* Meisn.; E. Asia.

Microbotryum flosculorum (de Candolle) K. Vánky, **comb. nov.**
Basionym: *Uredo flosculorum* de Candolle, Fl. franç. 6:79, 1815. – *Caeoma flosculorum* (DC.) Link, Linné's Species Plantarum, Ed. 4, 6(2):21, 1825. – *Ustilago flosculorum* (DC.) Fries, Syst. Myc., etc., Vol. 3, sect. 2, p. 518, 1832. – Type on "Scabieuse des champs" (= *Knautia arvensis*), France, Alpes Maritimes, A. P. de Candolle.

On Dipsacaceae: *Knautia arvensis* (L.) Coulter, *K. dipsacifolia* Kreutzer (*K. sylvatica* (L.) Duby, nomen ambig.), *Succisa pratensis* Moench; Europe.

Microbotryum gayophyti (Harkness) K. Vánky, **comb. nov.**
Basionym: *Ustilago gayophyti* Harkness, Bull. Calif. Acad. Sci. 1:36, 1884. – Type on *Gayophytum ramosissimum* T. & G., USA, California, Placer Co., Mt. Sierra Nevada, summit, 22.VIII.1882, H. W. Harkness, 3391 (BPI 160496!).

Sori in the seeds filling the pods with a dark purplish-brown, semiagglutinated to powdery mass of spores. *Spores* globose, subglobose, ovoid, rarely elongated or irregular, (12–)13–16(–18) x 13–18(–20) µm, purplish-brown, in LM finely verruculose-reticulate, 7–15 meshes per spore diameter, muri 1–1.5 µm high, in SEM spores rounded-reticulate, interspaces with one or several minute warts.

On Onagraceae: *Gayophytum caesium* T. & G., *G. intermedium* Rydb., *G. lasiospermum* Greene, *G. nuttallii* T. & G., *G. ramosissimum* T. & G., *G. umbellatum* (?); N. America.

Microbotryum goeppertianum (J. Schröter) K. Vánky, **comb. nov.**
Basionym: *Ustilago goeppertiana* J. Schröter, in Cohn, Krypt. Fl. Schles. 3:272, 1887. – Type on *Rumex acetosa* L., Germany, Silesia, Breslau [now Poland, Wroclaw].

On Polygonaceae: *Rumex* (Subgen. *Acetosa*) *acetosa* L., *R. arifolius* All., *R. scutatus* L. (*R. alpestris* Jacq., p. p., nomen ambiguum), *R. thyrsiflorus* Fingerh. (*R. auriculatus* Wallr.); Europe.

Microbotryum himalense (Kakishima & Ono) K. Vánky, **comb. nov.**
Basionym: *Sphacelotheca himalensis* Kakishima & Ono, in Watanabe & Malla, Cryptogams of the Himalayas 1:127, 1988. – *Ustilago himalensis* (Kakishima & Ono) K. Vánky & Oberwinkler, 1994:50. – Type on *Bistorta macrophylla* (D. Don) Sojak (= *Polygonum macrophyllum* D. Don), Nepal, Langtang Valley, Langtang-Kyangjin, alt. c. 3500 m, 2.IX.1986, Y. Ono (86 NE-205; Tsukuba-S1023, HUV 13586!).

On Polygonaceae: *Polygonum* (Sect. *Bistorta*) *bistorta* L., *P. macrophyllum* D. Don; C. & E. Asia.

Microbotryum holostei (de Bary) K. Vánky, **comb. nov.**
Basionym: *Ustilago holostei* de Bary, in Fischer von Waldheim, Jahrb. Wiss. Bot. 7:105, 1869/70. – Type on *Holosteum umbellatum* L., Germany, Halle a/S., IV.1868, A. de Bary.

On Caryophyllaceae (Subf. Alsinoideae): *Holosteum umbellatum* L.; Europe.

Microbotryum intermedium (Schröter) K. Vánky, **comb. nov.**
Basionym: *Ustilago intermedia* Schröter, in Rabenhorst, Fgi. eur. No. 1696, 1873; Hedwigia 12:149, 1873. – Type on *Scabiosa columbaria* L., Germany, Baden-Württemberg, "September 1872 bei Schloss Favorite bei Baden, und November 1872 im Iffezheimer Walde bei Rastatt", J. Schröter; isotypes in Rbh., Fgi. eur. No. 1696 (HUV 3895!).

On Dipsacaceae: *Scabiosa balcanica* Velen., *S. columbaria* L., *S. lucida* Vill., *S. ochroleuca* L., *S. triandra* L.; Europe, Asia.

Microbotryum jehudanum (Zundel) K. Vánky, **comb. nov.**

Basionym: *Ustilago jehudana* Zundel, Mycologia 36:401, 1944. – Type on *Silene apetala* Willd., Palestine, Desert of Jehuda, 25.III.1935, T. Rayss (BPI 162085!).

Sori in the seeds (not in the anthers as given originally) filling the capsules with a dark purplish-brown, dusty spore mass. *Spores* globose or subglobose, rarely broadly ellipsoidal, 12–15 x 13–16 µm, violet tinted dark reddish-brown, reticulate, 5–8 rounded-polygonal meshes per spore diam., muri 1–1.5 µm high, in SEM their inner surface often is very finely verruculose.

On Caryophyllaceae (Subfam. Silenoideae): *Silene apetala* Willd., *S. colorata* Poiret, *S. crassipes* Fenzl; Mediterranean Region (S. Europe, S.W. Asia).

Microbotryum koenigiae (Rostrup) K. Vánky, **comb. nov.**

Basionym: *Ustilago koenigiae* Rostrup, Meddel. Grønland 3:532, 1888. – Type on *Koenigia islandica* L., Greenland, Holsteinsborg, 6.VIII.1884, E. Warming & T. Holm (C!).

On Polygonaceae: *Koenigia islandica* L.; Arctic Europe, Greenland, Asia.

Microbotryum kuehneanum (Wolff) K. Vánky, **comb. nov.**

Basionym: *Ustilago kuehneana* Wolff, Bot. Z. 32:815, 1874. – Type on *Rumex acetosella* L., Germany, Halle A/S., Dölauer Heide, VI.1871, R. Wolff.

Ustilago utriculosa L.-R. & C. Tul. var. *rumicis* Berkeley, 1874:59. – *Ustilago rumicis* (Berk.) G. P. Clinton, 1904:380. – Lectotype on *Rumex acetosella* L., USA, (designated by Clinton, 1906:23) South Carolina, Santee Canal (FH).

Ustilago acetosellae R. Maire, 1915:79. – Type on *Rumex acetosella* L. subsp. *angiocarpus* Murb., Algeria, Fort-National, roadside of Taourirt–Amokhran, 8.IV.1912, R. Maire; isotypes in Maire, Mycoth. Bor.-Afric. No. 28 (HUV 3208!).

On Polygonaceae: *Rumex* (Subgen. *Acetosella*) *acetosella* L., *Rumex* sp.; Europe, N. Africa, N. America.

Reported *Ustilago kuehneana* on *Rumex* (Subgen. *Acetosa*) *arifolius* All., and *R. tuberosus* L. must be checked.

Microbotryum longisetum (K. Vánky & Oberwinkler) K. Vánky, **comb. nov.**

Basionym: *Ustilago longiseta* K. Vánky & Oberwinkler, Nova Hedwigia, Beiheft 107:54, 1994. – Type on *Polygonum longisetum* De Bruyn, China (Taiwan), Pingtung Prefecture, near Szu Chung, alt. c. 50 m, 22.X.1985, K. Vánky (HUV 13888!, isotypi in Vánky, Ust. exs. No. 786).

On Polygonaceae: *Polygonum* (Sect. *Persicaria*) *longisetum* De Bruyn (*P. caespitosum* Blume var. *longisetum* (De Bruyn) Stew.); E. Asia.

Microbotryum marginale (de Candolle) K. Vánky, **comb. nov.**

Basionym: *Uredo bistortarum* DC. [var.] *marginalis* de Candolle, Fl. franç. 6:76, 1815. – *Caeoma marginale* (DC.) Link, in Linné, 1825:10. – *Uredo marginalis* (DC.) Rabenhorst, 1844:7. – *Ustilago marginalis* (A. P. de Candolle) J. H. Léveillé, in d'Orbigny, 1849:778. – *Ustilago bistortarum* (DC.) Körnicke var. *marginalis* (DC.) Lindeberg, 1959:110. – Type on *Polygonum bistorta* L., France, Savoie, J. L. Bonjean.

Uredo pteridiformis Funck, 1820:4 (n. v.). – Type on *Polygonum bistorta* L., Germany, Bayern, Fichtelgebierge; isotypes in Funck, Crypt. Gew. Fichtelgeb. No. 564.

On Polygonaceae: *Polygonum* (Sect. *Bistorta*) *bistorta* L., *P. bistortoides* Pursh; Europe, N. America.

Microbotryum moenchiae-manticae (Lindtner) K. Vánky, **comb. nov.**
Basionym: *Ustilago moenchiae-manticae* Lindtner, Bull. Mus. Hist. Nat. Serbe, Ser. B, 3:32, 1950. – Lectotype on *Moenchia mantica* (L.) Bartl., Yugoslavia, Serbia, (designated by Vánky, 1985:223) Rudnik near Milanovac, "Ceramide", 15.VI.1946, V. Lindtner (HUV 4123!); isolectotypes in Ust. Jugosl. No. 3.

On Caryophyllaceae (Subfam. Alsinoideae): *Moenchia mantica* (L.) Bartl.; Europe.

Microbotryum moehringiae (Togashi & Maki) K. Vánky, **comb. nov.**
Basionym: *Ustilago moehringiae* Togashi & Maki, Ann. Phytopathol. Soc. Japan 10:139, 1940. – Type on *Moehringia platysperma* Maxim., Japan, Chikuzen Prov. [= Fukuoka Pref.], Yoshikawa-mura, 7.V.1938, Y. Maki (SAPA!).

Sori in the ovaries. Spore mass purplish-black, powdery. *Spores* globose, subglobose, rarely ovoid to broadly ellipsoidal, 12–14.5 x 12–16 µm, purplish-brown, reticulate, 5–8 polygonal meshes per spore diameter, muri 1–2(–2.5) µm high, in median view appearing as subacute projections.

On Caryophyllaceae (Subfam. Alsinoideae): *Moehringia platysperma* Maxim.; Japan.

Remarks: In the original description the spores are verruculose-reticulate (which could not be confirmed) and the values of 8.2–14 µm given for the spore measurements, certainly refer to the spores without taking the ornamentation into consideration.

Microbotryum morinae (Padwick & A. Khan) K. Vánky, **comb. nov.**
Basionym: *Ustilago morinae* Padwick & A. Khan, Mycol. Pap. 10:1; 1944. – Type on *Morina longifolia* Wall., India, Kashmir, above Aru, alt. 11000 ft, 11.VII.1941, G. W. Padwick (587; HCIO 10283!).

Sori destroying the ovaries and the inner floral parts which are filled with a purplish-brown, powdery mass of spores. *Spores* globose, subglobose, ovoid or broadly ellipsoidal, 11–15(–16) x 12–17 µm, violet tinted light brown, finely reticulate, 8–13 irregularly polygonal meshes per spore diameter, interspaces often with small warts; wall 1–1.5 µm thick, including the low (c. 0.5 µm) muri.

On Dipsacaceae: *Morina longifolia* Wall.; C. Asia.

Microbotryum nannfeldtii (Liro) K. Vánky, **comb. nov.**
Basionym: *Ustilago nannfeldtii* Liro, Mycotheca fennica. Die Etiketten. No. 301-600, p. 109, 1939. – *Ustilago nannfeldtii* Liro, Ann. Acad. Sci. Fenn., Ser. A, 42(1):226, 1938 (nomen illeg., diagn. german. tantum). – Type on *Gentiana nivalis* L., Sweden, Härjedalen, Tännäs Par., Hamrafjället Mt., the S. slope, subalpine region, 26.VII.1933, J. A. Nannfeldt (4717; UPS!).

On Gentianaceae: *Gentiana nivalis* L.; N. Europe.

Microbotryum nelsonianum (Savile) K. Vánky, **comb. nov.**

Basionym: *Ustilago nelsoniana* Savile, in Savile & Parmelee, Mycologia 48:585, 1956. – Type on *Montia cordifolia* (S. Watson) Pax. & K. Hoffm., Canada, British Columbia, 4 mi S.S.E. of Nelson, outlet of Cottonwood Lake, 19.VI.1953, J. A. Calder & D. B. O. Savile (9380), DAOM 44131 (ht), HUV 15419! (it).

Sori in the anthers forming purplish-brown, powdery spore masses. *Spores* variable in shape and size, ovoid, ellipsoidal, slightly irregular, rarely subglobose or elongate, 10.5–15 x 11–17(–18.5) µm, violet tinted light brown; wall 2–3.5 µm thick, minutely reticulate, sometimes incompletely, 7–13 irregular meshes per spore diameter, interspaces often with one or several small warts, muri 1.5–3 µm high, in median view with blunt edges.

On Portulacaceae: *Montia cordifolia* (S. Watson) Pax. & K. Hoffm.; N. America.

Microbotryum nepalense (Liro) K. Vánky, **comb. nov.**

Basionym: *Ustilago nepalensis* Liro, Ann. Acad. Sci. Fenn., Ser. A, 17:184, 1924. – *Melanopsichium nepalense* (Liro) Zundel, 1953:46 (as "*nepalensis*"). – Type on *Polygonum alatum* Buch.-Ham. ex D. Don, China, Sheni, IX.1897, G. Giraldi (H!).

Sphacelotheca nankingensis Zundel, 1944:406. – Type on *Polygonum* "*chinense*" L. (= misnamed *P. alatum*, teste K. Vánky; comp. also Ling, 1953:321), China, Anhwei Prov., Chiu Hua Shan, Ching Yang Hsien, Shiang Lu Shih, 20.X.1932, S. Y. Cheo (No. 1327; BPI 195105!).

On Polygonaceae: *Polygonum* (Sect. *Cephalophilon*) *alatum* Buch.-Ham. ex D. Don (*P. nepalense* Meissn.); Asia.

Microbotryum nivale (Liro) K. Vánky, **comb. nov.**

Basionym: *Ustilago nivalis* Liro, Ann. Acad. Sci. Fenn., Ser. A, 17:42, 1924. – Type on *Sagina nivalis* (Lindblad) Fries (= *S. intermedia* Fenzl), Spitsbergen, Advent Bay, 9.VIII.1882, A. G. Nathorst (H); Topotype: 30.VII.1926, J. Lagerkranz (HUV 4232!).

On Caryophyllaceae (Subfam. Alsinoideae): *Sagina intermedia* Fenzl (*S. nivalis* (Lindblad) Fries); Arctic Europe, Greenland.

Microbotryum ocrearum (Berkeley) K. Vánky, **comb. nov.**

Basionym: *Ustilago ocrearum* Berkeley, in Hooker's J. Bot. Kew Gard. Misc. 6:207, 1854. – Type on *Polygonum* sp. (= *P. campanulatum*; comp. Ling, 1953:322), E. Nepal, Nangki, alt. 10.000 feet, coll. Dr. Hooker (K!).

Ustilago caulicola Zundel, 1942:123. – Type on *Polygonum campanulatum* Hooker fil. var. *fulvidum* Hooker fil., China, Fan Ching Shan, Chiang Kou, 1.X.1931, S. Y. Cheo, Fungi of Kweichow Province, No. 622; isotypes in Rel. Farlow. No. 950 (HUV 3539!, 13679!).

Sphacelotheca smithii Petrak, 1947:115. – Type on *Polygonum* sp., China, Szechuan Prov., W. Tahsiangling, alt. 1200 m, 24.VI.1934, H. Smith (10382; BPI 193995!).

On Polygonaceae: *Polygonum* (Sect. *Aconogonon*) *campanulatum* Hooker fil, its var. *fulvidum* Hooker fil, and *Polygonum* sp.; Asia.

Microbotryum onopordi (K. Vánky) K. Vánky, **comb. nov.**
Basionym: *Ustilago onopordi* K. Vánky, Mycotaxon 41:487, 1991b. – Type on *Onopordum bracteatum* Boiss. & Heldr. subsp. *ilex* (Janka) Franco, Greece, Thessalia Div., Lárisa Prov., Halkiades, 5.VII.1989, coll. D. T. Briese & A. Shepard, comm. S. Hasan (HUV 15101!); isotypes in BPI, MPU and in Vánky, Ust. exs. No. 882.

On Compositae (Subfam. Asteroideae): *Onopordum bracteatum* Boiss. & Heldr. subsp. *ilex* (Janka) Franco (*O. ilex* Janka); S. Europe.

Microbotryum parlatorei (Fischer von Waldheim) K. Vánky, **comb. nov.**
Basionym: *Ustilago parlatorei* Fischer von Waldheim, Hedwigia 15:177, 1876. – Type on *Rumex maritimus* L., Russia, Stepankowo, 25 km N. W. of Moscow, IX.1876, A. Fischer von Waldheim; isotypes in Rbh., Fgi. eur. No. 2291 (HUV 4317!).

Ustilago domestica Brefeld, 1895:28 (nomen nudum), 1895:135. – Type on *Rumex domesticus* Hartman (= *R. longifolius* DC.), Norway, Telemark, 1888, O. Brefeld (BPI 160225 & 194474!, H).

Ustilago lagerheimii Brefeld, 1895:136. – Type on *Rumex* sp., Ecuador, Quito, Rumipamba, Cotopaxi Mt., I.1891, G. Lagerheim (BPI 194471!, H).

On Polygonaceae: *Rumex* (Subgen. *Rumex*) *alpinus* L., *R. altissimus* Wood, *R. crispus* L., *R, dentatus* L. (*R. limosus* Thuill.), *R. longifolius* DC. (*R. domesticus* Hartman), *R. maritimus* L., *R. mexicanus* Meissn., *R. obtusifolius* L., *R. palustris* Sm.; Europe, N. & S. America.

Microbotryum picaceum (Lagerheim & Liro) K. Vánky, **comb. nov.**
Basionym: *Ustilago picacea* Lagerheim & Liro, in Liro, Ann. Acad. Sci. Fenn., Ser. A, 17:8, 1924. – Lectotype on *Koenigia islandica*, (designated by B. Lindeberg, 1959:128) Norway, Finnmark, Alten, in the high mountains between Kåfjord and Kvaenangen, VIII.1895, G. Lagerheim (H).

On Polygonaceae: *Koenigia islandica* L., *K. forrestii* (Diels) Mesícek & Soják; Arctic Europe, Asia.

Microbotryum pinguiculae (Rostrup) K. Vánky, **comb. nov.**
Basionym: *Ustilago pinguiculae* Rostrup, Festskr. Bot. Foren. Kjøbenhavn, 1890:144, 1890. – Type on *Pinguicula vulgaris* L., Denmark, Jutland [= Jylland], "Bjærget i Thy", 20.VII.1888, E. Warming (C).

On Lentibulariaceae: *Pinguicula alpina* L., *P. grandiflora* Lam., *P. villosa* L., *P. vulgaris* L.; Europe, N. America.

Microbotryum piperii (G. P. Clinton) K. Vánky, **comb. nov.**
Basionym: *Ustilago piperii* G. P. Clinton, Proc. Boston Soc. Nat. Hist. 31:382, 1904. – Type on *Polygonum phytolaccaefolium* Meisn., USA, Idaho, Shoshone Co, Bitterroot Mts., Bald Mt., alt. 6000 ft, VIII.1902, C. V. Piper (BPI 114059 & 165463!).

Sphacelotheca polygoni-alpini P. Cruchet, 1908:247. – *Ustilago poligoni-alpini* (P. Cruchet) Zundel, 1953:192. – Type on *Polygonum alpinum* All., Italy, Alpes valaisannes, S. slope of Gries pass, between Bettelmatten and Morast, alt.

2000 m, 8.VIII.1907, P. Cruchet (LE!); Topotype: 13.VIII.1987, F. Oberwinkler, A. Nagler, E., U. & K. Vánky (HUV 13113); isotopotypes in Vánky, Ust. exs. No. 641 (HUV 13308).

Ustilago sinkiangensis Wang, 1962:134. – Type on *Polygonum* sp. (= *P. alpinum*) China, Sinkiang Distr., Ta-cheng, Ha-mu-sze-tai, 26.VIII.1959, coll. H.-Y. Liu (731; HMAS; isotype HUV 7992!).

On Polygonaceae: *Polygonum* (Sect. *Aconogonon*) *alpinum* All., *P. davisiae* Brew., *P. phytolaccaefolium* Meisn., *P. songoricum* Schrenk; Europe, Asia, N. America.

Microbotryum polygoni-alati (Thirum. & M. S. Pavgi) K. Vánky, **comb. nov.** Basionym: *Ustilago polygoni-alati* Thirumalachar & M. S. Pavgi, Sydowia 20:24, 1967(1968). – Type on *Polygonum alatum* Buch-Ham. ex D. Don, India, Uttar Pradesh, Dehra Dun distr., Chakrata, at Mundah, 29.IX.1934, K. Bagchee (1240).

On Polygonaceae: *Polygonum* (Sect. *Cephalophilon*) *alatum* Buch-Ham. ex D. Don (*P. nepalense* Meissn.); E. & S. Asia.

Microbotryum prostratum (K. Vánky & Oberwinkler) K. Vánky, **comb. nov.** Basionym: *Ustilago prostrata* Vánky & Oberwinkler, in Vánky, Mycotaxon 40:164, 1991a. – Type on *Polygonum prostratum* R. Br., Australia, New South Wales, 23 km S.E. Nimmitabel, pr. "Pipers Lookout", alt. c. 850 m, 4.II.1989, G. Kirby (HUV 14867!), isotypes in Herb. Kirby (The Flinders University of South Australia, Adelaide) and in BPI. Paratype: on *Polygonum prostratum*, Australia, Queensland, Nanango, IX.1947, R. F. Langdon, BRIP 15381!

On Polygonaceae: *Polygonum* (Sect. *Persicaria*) *prostratum* R. Br.; Australia.

Microbotryum radians (K. Vánky & Oberwinkler) K. Vánky, **comb. nov.** Basionym: *Ustilago radians* K. Vánky & Oberwinkler, Nova Hedwigia, Beiheft 107:68, 1994. – Type on *Polygonum careyi* Olney, USA, New York, Warren Co., old field bordering outlet of Rush Pond, Glen Lake, alt. 410–415 ft., 2.IX.1971, leg. S. J. Smith (46934) & R. E. Andrus. Holotypus in HUV 13760!; isotypi in BPI, M, NY.

On Polygonaceae: *Polygonum* (Sect. *Persicaria*) *careyi* Olney; N. America.

Microbotryum rhei (Zundel) K. Vánky, **comb. nov.**

Basionym: *Tilletia rhei* Zundel, Mycologia 36:410, 1944. – *Sphacelotheca rhei* (Zundel) Vánky, 1989:156. – *Ustilago rhei* (Zundel) K. Vánky & Oberwinkler, 1994:72. – Type on *Rheum franzenbachii* Mürt (= *R. undulatum* L., = *R. rhabarbarum* L., p. p.), China, Shanshi Prov., Chiao-Ch'eng Distr., Yünting-Shan, alt. 2500 m, 2.IX.1924, H. Smith (Plantae sinenses 7451; S!, UPS!).

Sphacelotheca titovii Golovin, 1950:10. – Type on *Rheum maximoviczi* A. Los., Kazakhstan, valley of Karapchur River, Myndzhelike, south of Bol'shoy Tsimgan, alt. 2700 m, V. Titov.

Ustilago hsuii Wang, 1962:133. – Type on "*Rumex*" sp. [= misnamed *Rheum* sp., teste Vánky, 1989:155], China, Sinkiang Prov., Barto muchong, alt. 2100 m, 30.VIII.1958, Hsu Lian-wang (377; HMAS 31558, HUV 13602!).

On Polygonaceae: *Rheum maximoviczi* A. Los., *R. undulatum* L. (*R. franzenbachii* Mürt; *R. rhabarbarum* L., p. p.), *R. wittrockii* Lundstr.; Asia.

Microbotryum scolymi (Roumeguère & Trabut) K. Vánky, **comb. nov.**
Basionym: *Ustilago scolymi* Roumeguère & Trabut ex Juel, Bull. Soc. Mycol. France 17:257, 1901; Roumeguère & Trabut, in Roumeguère, Fgi. sel. exs. No. 5129, 1890, nomen nudum (n. v.). – Type on *Scolymus hispanicus* L., Algeria, near Algiers.

On Compositae (Subfam. Cichorioideae): *Scolymus hispanicus* L.; Mediterranean Region (S. Europe, N. Africa).

Microbotryum shastense (Zundel) K. Vánky, **comb. nov.**
Basionym: *Ustilago shastensis* Zundel (as "*shastense*"), in Mycobiota of North America, Mycobiota of Mount Shasta, ex Herbario Wm. Bridge Cooke. No. 63. Issued 30.III.1940. – Type on *Polygonum shastense* Brewer, USA, California, Mount Shasta, "Horse Camp", 8000 ft, 8.VIII.1939, W. B. Cooke (13381); isotypes in Mycobiota of North America, Mycobiota of Mount Shasta, ex Herbario Wm. Bridge Cooke. No. 63 (HUV 4507!); topotypes in Vánky, Ust. exs. No. 717.

On Polygonaceae: *Polygonum* (Sect. *Polygonum*) *shastense* Brewer; N. America.

Microbotryum stewartii (Zundel) K. Vánky, **comb. nov.**
Basionym: *Ustilago stewartii* Zundel, Mycologia 36:403, 1944. – Type on *Rheum webbianum* Royle, India, Kashmir, Northwest Himalaya, Deosai Plains, Usi Mar, alt. c. 14000 ft, 1.VIII.1940, R. R. Stewart (BPI 166872 & 188945!).

On Polygonaceae: *Rheum webbianum* Royle; Asia.

Microbotryum stygium (Liro) K. Vánky, **comb. nov.**
Basionym: *Ustilago stygia* Liro, Ann. Acad. Sci. Fenn., Ser. A, 17:25, 1924. – Lectotype on *Rumex acetosa* L., (designated by Lindeberg, 1959:138) Germany, Sachsen, Königstein, V.1881, W. Krieger; isolectotypes in Thümen, Mycoth. univ. No. 2133 (as *U. kuehneana*; HUV 9374!).

On Polygonaceae: *Rumex* (Subgen. *Acetosa*) *acetosa* L., *R. arifolius* All., *R. scutatus* L. (*R. alpestris* Jacq., p. p., nomen ambig.), *R. thyrsiflorus* Fingerh.; Europe, Asia.

Microbotryum tenuisporum (Ciferri) K. Vánky, **comb. nov.**
Basionym: *Ustilago tenuispora* Ciferri, Ann. Mycol. 29:58, 1931. – *Ustilago utriculosa* (Nees) Unger var. *microspora* Spegazzini, 1902:58. – *Ustilago microspora* (Speg.) Liro, 1924:234 (non Schröter & P. Hennings, in Hennings, 1896:215). – *Ustilago polygoni-punctati* Savile, 1953:670. – Type on *Polygonum acre* H., B. & K. (= *P. punctatum*), Argentina, near Cordoba, 1896, T. Stuckert (LPS 3074!).

On Polygonaceae: *Polygonum* (Sect. *Persicaria*) *acuminatum* H., B. & K., *P. barbatum* L., *P. hydropiper* L, *P. punctatum* Elliott (*P. acre* H., B. & K.); N. and S. America, Asia, Australia, New Zealand.

Microbotryum tovarae (Savile) K. Vánky, **comb. nov.**
Basionym: *Ustilago anomala* J. Kunze ex Winter var. *tovarae* Savile, Canad. J. Bot. 31:670, 1953. – *Ustilago tovarae* (Savile) K. Vánky & Oberwinkler. – Type on *Polygonum virginianum* L. (*Tovara virginiana* (L.) Raf.), Canada, Quebec, Berthierville, 1932, R. Pomerleau (DAOM 18882!).

On Polygonaceae: *Polygonum* (Sect. *Tovara*) *virginianum* L.; N. America.

Microbotryum tuberculiforme (H. & P. Sydow) K. Vánky, **comb. nov.**
Basionym: *Ustilago tuberculiformis* H. & P. Sydow, Ann. Mycol. 1:22, 1903. – Type on *Polygonum runcinatum* Hamilt. ex D. Don, China, Hupeh Prov., A. Henry.

Ustilago foliorum S. Ito, 1935:88. – Type on *Polygonum morrisonense* Hayata (= *P. runcinatum*), Taiwan, Taihoku Prov., Mt. Nankotaizan, 29.VII.1934, Y. Hashioka (SAPA!).

On Polygonaceae: *Polygonum* (Sect. *Cephalophilon*) *runcinatum* Hamilt. ex D. Don (*P. morrisonense* Hayata); E. Asia.

Microbotryum tumeforme (L. Ling) K. Vánky, **comb. nov.**
Basionym: *Ustilago tumeformis* L. Ling, Sydowia 4:77, 1950. – Type on *Polygonum chinense* L., India, Darjeeling, 19.VII.1909, W. McRae (BPI 168665!).

On Polygonaceae: *Polygonum* (Sect. *Cephalophilon*) *chinense* L.; S. Asia.

Microbotryum warmingii (Rostrup) K. Vánky, **comb. nov.**
Basionym: *Ustilago warmingii* Rostrup, Bot. Tidsskr. 15:229, 1886. – Type on *Rumex crispus* L. [= misnamed *R. longifolius* DC., teste A. Blytt, 1896(6):28], Norway, Finnmark, Kåfjord, 1885, E. Warming (C!).

On Polygonaceae: *Rumex* (Subgen. *Rumex*) *aquaticus* L., *R. crispus* L., *R. longifolius* DC.; Europe, Asia, N. & S. America.

The authorship of *Microbotryum stellariae* and *M. scabiosae*.

According to the International Code of Botanical Nomenclature (ICBN §43.1) "A name of a taxon below the rank of genus is not validly published unless the name of the genus or species to which it is assigned is validly published at the same time or was validly published previously." No description of the genus *Farinaria* was given by Sowerby (confirmed also by Dr. L. Holm, in litt.). Therefore, *Farinaria stellariae* Sowerby (1803, Tab. 396, fig. 1) and *F. scabiosae* Sowerby (1803, Tab. 396, fig. 2) are invalid names, and all combinations based on these names are invalid combinations.

When Liro (1924:39) made the new combination of "*Ustilago stellariae* (Sowerby) Liro", and provided a description for this fungus, he unintentionally described a new species, *Ustilago stellariae* Liro. The combinations based on the invalid *Farinaria stellariae* Sowerby (1803, Tab. 396, fig. 1), have to be considered as based on *U. stellariae* Liro. The name and authorship of this fungus and its synonyms should be:

Microbotryum stellariae (Liro) G. Deml & Oberwinkler, 1982b:354, [as "(Sowerby) G. Deml & Oberw."].

Farinaria stellariae Sowerby (1803, Tab. 396, fig. 1; nomen invalidum). – *Ustilago stellariae* Liro, 1924:39 [as "(Sowerby) Liro"]. – *Ustilago violacea* (Pers.: Pers.) Roussel var. *stellariae* (Liro) Savile, 1953:674 [as "var. *stellariae* (Sow.) Savile"].

When Liro (1924:39) described *Ustilago stellariae*, he enumerated several exsiccatae and a great number of collections from Finland, without mentioning a type. Of these, I am designating as lectotype "*Ustilago violacea* (Pers.) forma *stellariae gramineae*" on *Stellaria graminea* L., Germany, Baden-Württemberg, Freiburg i/B., near Littenweiler, VII.1876, leg. J. Schröter. Hololectotype in Liro's herbarium, Helsinki, Finnland (HPP), isolectotypes in Rbh., Fgi. eur. No. 2295 [as *Ustilago violacea* (Pers.) forma *stellariae gramineae*], HUV 5156!

On Caryophyllaceae (Subfam. Alsinoideae): *Arenaria*, *Cerastium*, *Minuartia*, *Myosoton*, *Stellaria* species; Probably world-wide.

The authorship of *Microbotryum scabiosae*.

Without giving any description, the name *Farinaria scabiosae* Sowerby (1803, Tab. 396, fig. 2; nom. inval.) was transferred into the genus *Ustilago* by Winter (1880:159; comb. inval.), into *Microbotryum* by G. Deml & Prillinger (in Prillinger et al., 1991:10; comb. inval.), and into *Bauhinus* (a superfluous name for *Microbotryum*) by R. T. Moore (1992:99; comb. inval.). These conbinations are invalid combinations because they are based on an invalid name. The name could be considered as an unintentionally described new species, similar to that of *Ustilago stellariae* Liro, mentioned above. However, it is a question of priority: who gave the first, useful, effective and valid description of this fungus and therefore is the one the name could be ascribed to. This can not be stated with certainty. In addition, the typification of such an old name could also be difficult if not impossible. Therefore, for the validation of this name, I prefer to describe it as:

Microbotryum scabiosae K. Vánky, **sp. nov.**

Typus in matrice *Knautia arvensis* (L.) Coult., Suecia, Dalarna, pag. Gagnef, prope lacum Tjärnsjön, alt. c. 170 m, leg. T. & K. Vánky. Holotypus in Herbario Ustil. Vánky (HUV 6845), isotypi in Vánky, Ust. exs. No. 245 (ut *U. scabiosae*).

Sori in antheris, massa sporarum pallide ochracea, pulverea flores implentes. Infectio systemica. *Sporae* globosae, subglobosae usque ovoideae, 7.5–11 x 8–11(–13.5) µm, flavido-hyalinae, perlucidae, leniter reticulatae, 6–10 maculis in diametro sporae, muri cca. 0,8 µm alti, alis marginalibus non conspicuis. *Germinatio* cum basidiis 4-cellularibus, basidiosporas et laterales et terminales ovoideas gerentibus.

Sori in anthers, filling the flowers with a pale ochraceous, powdery spore mass. Infection systemic. *Spores* globose, subglobose to ovoid, 7.5–11 x 8–11(–13.5) µm, yellowish-hyaline, pellucid, finely reticulate, 6–10 meshes per spore diameter, muri c. 0.8 µm high, marginal wings not conspicuous. *Germination* results in four-celled basidia on which lateral and terminal, ovoid basidiospores develop.

On Dipsacaceae: *Knautia* species, Europe.

Key to the recognised *Microbotryum* species, based on host taxonomy.

On **Caryophyllaceae:**

1. Sori in the seeds...2
– Sori in the anthers, rarely also in the filaments and inner floral parts 8
2. Spores verruculose-reticulate. On *Arenaria* .... *M. arenariae-bryophyllae*
– Spores reticulate 3
3. Spores 9.5–13 µm long. Muri 0.7–1 µm high. On *Sagina* ....*M. nivale*
– Spores larger. Muri higher. Not on *Sagina*..4
4. Spores 11–14(–15) µm long. Meshes per spore diam. 4–7. On *Holosteum*......... ....*M. holostei*
– Spores 12–16(–17) µm long. Meshes more. Not on *Holosteum*.......................5
5. Meshes per spore diam. 6–9. On *Moenchia* ....*M. moenchiae-manticae*
– Meshes per spore diam. fewer. Not on *Moenchia*...6
6. Muri 1–2(–2.5) µm high. On *Moehringia* ....*M. moehringiae*
– Muri 1–1.5 µm high. Not on *Moehringia*..7
7. In SEM muri finely verruculose. No protuberance at the bottom of the meshes. On *Silene*...*M. jehudanum*
– In SEM muri not so. At the bottom of the meshes often a large protuberance. On *Arenaria, Cerastium, Stellaria*...*M. duriaeanum*
8(1). Spores reticulate..9
– Spores verruculose or verruculose-reticulate...14
9. Sori in the anthers only 10
– Sori in the anthers and other floral parts. Spores 7–11 µm. On *Silene* (Sect. *Otites*) ....*M. majus*
10. Spores 5–8 µm. On Alsinoideae: *Arenaria*, *Cerastium*, *Minuartia*, *Myosoton*, *Stellaria*...*M. stellariae*
– Spores 6–11 µm. On Silenoideae 11
11. Meshes rounded to polygonal 12
– Meshes irregularly polygonal..13
12. Meshes rounded, 0.5–0.8 µm in diam. Spore mass dark violet. On *Dianthus* ... .*M. dianthorum*
– Meshes rounded to regularly polygonal, up to 1 µm in diam. Spore mass brownish-violet. On *Cucubalus*, *Dianthus*, *Gypsophila*, *Lychnis*, *Petrorhagia*, *Saponaria, Silene* ....*M. violaceum*
13. Meshes up to 1.4 µm in diam. Spore mass dark brownish-violet. On *Silene*..... ....*M. lychnidis-dioicae*
– Meshes up to 1.2 µm in diam. Spore mass pale greyish-violet. On *Silene*, *Lychnis*..*M. silenes-inflatae*
14(8). Spores verruculose. Spore mass light brownish-violet. On *Silene* ....*M. violaceo-verrucosum*
– Spores irregularly and incompletely verruculose-reticulate. Spore mass dark brownish-violet. On *Silene* ....*M. violaceo-irregulare*

On **Compositae:** (in flower heads; spores reticulate)

1. Spore mass light. Muri in median view spiniform. On *Onopordum*.................. ....*M. onopordi*
– Spore mass dark. Muri not spiniform in median view 2

2. Muri over 1.5 µm high. Spores uniformly pigmented 3
– Muri up to 1.5 µm high. Spores often lighter on one side 4
3. Muri in median view appear as radiate marginal wings. Meshes per spore diam. (4–)5–8(–9). On *Carduus, Silybum* .... *M. cardui*
– Muri not appearing as wings. Meshes per spore diam. 6–10. On *Scolymus* .... *M. scolymi*
4. Spores 10–15 µm long. On *Scorzonera* .... *M. scorzonerae*
– Spores 13–19 µm long 5
5. Interspaces with evident warts. On *Tragopogon* .... *M. tragopogonis-pratensis*
– Interspaces without evident warts. On *Cichorium* .... *M. cichorii*

On **Dipsacaceae**:
1. Sori in the ovaries and inner floral parts. On *Morina* .... *M. morinae*
– Sori in the anthers 2
2. Spore mass pale (white or pale ochraceous) 3
– Spore mass dark (purplish-brown) 4
3. Spores 8–11 µm. On *Knautia* .... *M. scabiosae*
– Spores 12–17 µm. On *Succisa* .... *M. succisae*
4. Meshes per spore diam. 6–10. On *Scabiosa* .... *M. intermedium*
– Meshes per spore diam. 9–16 5
5. Spores 12–18 µm, muri 1–1.5 µm high. On *Knautia, Succisa* .... *M. flosculorum*
– Spores 8–16 µm, muri 1.5–3 µm high. On *Cephalaria* .... *M. cephalariae*

On **Gentianaceae**: *Gentiana nivalis* (in seeds) .... *M. nannfeldtii*

On **Labiatae**: *Stachys, Salvia* (in anthers) .... *M. betonicae*

On **Lentibulariaceae**: *Pinguicula* (in anthers) .... *M. pinguiculae*

On **Onagraceae**: *Gayophytum* (in seeds) .... *M. gayophyti*

On **Polygonaceae**:

On ***Bilderdykia***
1. Spores 8.5–14 µm long. Meshes per spore diam. 4–6. Muri 1 µm high .... *M. anomalum*
– Spores 10–17 µm long. Meshes per spore diam. 5–8. Muri 1–1.5 µm high .... *M. cilinode*

On ***Koenigia***
1. Sori as fusiform swellings on the stems or pustules on the leaves. Spores 6.5–10 µm long, finely striate .... *M. koenigiae*
– Sori in the ovaries. Spores 11–18.5 µm long, finely and densely verruculose .... *M. picaceum*

On ***Oxyria***

Sori in the flowers. Spores 7–10 µm long, finely reticulate, meshes per spore diam. 5–9 .... *M. vinosum*

On ***Polygonum***

On Sect. *Aconogonon*
1. Sori completely destroying shoots and leaves, club-shaped, ramified or fasciate. Spores coarsely, spirally striate to cerebriform .... *M. ocrearum*
– Sori and spores otherwise 2
2. Sori in the flowers. Spores reticulate, meshes per spore diam. 6–9 .... *M. ahmadianum*
– Sori and spores otherwise 3

3. Sori in the abaxial side of the leaves as confluent pustules. Spore surface finely cerebriform, like fingerprints .... *M. piperii*

– Sori in the swollen floral branches and pedicels. Spores verruculose to verruculose-reticulate .... *M. bosniacum*

On Sect. *Bistorta*

1. Sori in the leaves 2

– Sori in the flowers or nuts 3

2. Sori linear along the margin of the leaves .... *M. marginale*

– Sori as round pustules .... *M. pustulatum*

3. Spores sparsely echinulate .... *M. himalense*

– Spores finely and densely verruculose 4

4. Sori in the nuts. Spores 8–13 µm long .... *M. dehiscens*

– Sori in the flowers. Spores 9–16 µm long .... *M. bistortarum*

On Sect. *Cephalophilon*

1. Sori in the leaf blades as slightly rised spots .... *M. tuberculiforme*

– Sori otherwise 2

2. Sori in the stems as fusiform swellings. Spores reticulate to incompletely reticulate-verruculose, meshes per spore diam. 10–15 .... *M. nepalense*

– Sori in different organs as globoid swellings 3

3. Spores in LM densely verruculose, in SEM incompletely verruculose-reticulate. Muri 0.2–0.3 µm high .... *M. polygoni-alati*

– Spores reticulate. Meshes per spore diam. 4–6. Muri 1.5–2.5 µm high .... *M. tumeforme*

On Sect. *Persicaria*

1. Spores relatively large, 13–18 µm long. Muri 1.5–2.5 µm high .... *M. radians*

– Spores smaller 2

2. Spore wall (incl. reticulum) 3.5–5 µm thick. Muri 1.5–3.5 µm high .... *M. longisetum*

– Spore wall less than 3.5 µm thick 3

3. Spore wall 1–1.5 µm thick. Muri 0.5–1 µm high .... *M. prostratum*

– Spore wall 1.5–3 µm thick 4

4. Spores 7–12 µm long. Wall 1.5 µm thick. Muri 0.8–1.2 µm high .... *M. tenuisporum*

– Spores larger. Wall thicker 5

5. Meshes per spore diam. 3–6. Wall 1.5–2.5 µm thick. Spores 8–14 µm long .... *M. cordae*

– Meshes per spore diam. (2–)3–4. Wall 2–3 µm thick 6

6. Muri 1–1.5 µm high. In SEM interspaces coarsely verrucose. Sori comprising all floral parts except distal part of the perianths. Spores 9–15 µm long .... *M. reticulatum*

– Muri 1.2–2 µm high. In SEM interspaces with a prominent tuberculum. Sori restricted to the filaments. Spores 9–13 µm long .... *M. filamenticola*

On Sect. *Polygonum*. Sori in the flowers. Spores reticulate. Meshes per spore diam. 6–10.

1. Spores 11–16 µm long .... *M. aviculare*

– Spores 8–10.5 µm long .... *M. shastense*

On Sect. *Tovara*

– Sori in the flowers. Spores reticulate. Meshes per spore diam. 5–7 ... *M. tovarae*

On ***Rheum***

1. Spores 8–11 µm long, finely reticulate, meshes per spore diam. 5–10 .... *M. stewartii*
– Spores 15–24 µm long, variously sculptured: very finely reticulate, meshes per spore diam. 9–18, but also verruculse-reticulate or verruculose .... *M. rhei*

On ***Rumex***

1. Spores 6–10.5 µm long. On Subgen. *Rumex* .... *M. warmingii*
– Spores more than 11 µm long 2
2. Meshes per spore diam. 8–14. On Subgen. *Acetosa* 3
– Meshes per spore diam. 5–10 4
3. Spore mass pale, flesh-coloured. Spores in median view with spine-like projections .... *M. goeppertianum*
– Spore mass dark, blackish-purple. Spores in median view with blunt projections .... *M. stygium*
4. Spores in median view with spine-like projections. Meshes per spore diam. 5–8 5
– Spores in median view with blunt projections. Meshes per spore diam. 6–10. On Subgen. *Rumex* 6
5. Muri 1–1.5 µm high. Spores 11–15(–16) µm long. On Subgen. *Rumex* .... *M. parlatorei*
– Muri 1.5–3 µm high. Spores 13–18(–20) µm long. On Subgen. *Acetosella* .... *M. kuehneanum*
6. Muri 1.5–2.5 µm high. Spores 13–18 µm long .... *M. coronatum*
– Muri 0.5–0.8 µm high. Spores 11–15 µm long .... *M. dumosum*

On **Portulacaceae**

1. Sori in the seeds 2
– Sori in the anthers (rarely also in the seeds) 3
2. Spores 15–21 µm long. Meshes per spore diam. 4–8. Muri 2.5–5 µm high. On *Calandrinia* .... *M. calandriniae*
– Spores 13–19 µm long. Meshes per spore diam. 6–10. Muri 1–2.5 µm high. On *Claytonia* .... *M. claytoniae*
3. Spores 5–10 µm long. On *Calandrinia* .... *M. calandriniicola*
– Spores 11–18.5 µm long. On *Montia* .... *M. nelsonianum*

There are several additional smut fungi which most probably belong to the genus *Microbotryum*. However, until the types or authentic material were studied to exclude possible synonymy, these are retained in *Ustilago*. Their descriptions are taken from the literature.

Ustilago alsines G. P. Clinton & Zundel (as "*alsineae*"), in Zundel, North American Flora 7:991, 1939. – Type on *Alsine praecox* A. Nelson, USA, Idaho, Flak's Store, 22.IV.1911, A. Nelson, BPI 157050 (n. v.; on loan).

Sori in the ovaries replacing the seeds by a dark brownish-purple, dusty spore mass. Spores globose, subglobose, mainly 10–14 µm in diameter, dark brownish-purple, minutely reticulate, muri 0.5–1 µm high.

On Caryophyllaceae (Subfam. Alsinoideae): *Stellaria nitens* Nutt. (*Alsine nitens* (Nutt.) Greene); N. America.

"*Alsine praecox* A. Nelson (*Stellaria praecox*)", described on smutted samples, is not a recognised plant species (Zundel, 1953:137).

Ustilago clintoniana Ciferri, Ann. Mycol. 26:64, 1928; nomen novum for *U. violacea* var. *major* Clinton (1902:139), not *U. major* Schröter (1887). – Type on *Silene watsonii* Rob., USA, Wash., Mt. Rainier.

Sori in the anthers which are filled with a brownish-violet, dusty mass of spores. Spores ovoid to spherical or somewhat irregular, deep violet, mainly 7–12 µm long, reticulate.

On Caryophyllaceae (Subfam. Silenoideae): *Silene macounii* Watson, *S. watsonii* Rob.; N. America.

Ustilago primulae Wettstein, 1886:73, type on *Primula clusiana* Tausch, Austria, Nieder-Österreich, Schneeberg Mt., near Vienna, 1884, J. Schneider.

Sori in the anthers as a grey, powdery spore mass. *Spores* globose, subglobose to irregularly rounded, 11–14 x 12–18 µm, light greyish-coloured, with hyaline endospore and densely reticulate, grey exospore.

On Primulaceae: *Primula clusiana* Tausch. Known from only the original description. No specimen is preserved in W, and the type specimen probably no longer exists.

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PODOSORDARIA: A REDEFINITION BASED ON CULTURAL STUDIES OF THE TYPE SPECIES, P. MEXICANA, AND TWO NEW SPECIES

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ABSTRACT

A cultural study of ***Podosordaria mexicana***, the type species of the genus, revealed that the anamorph does not produce disarticulating elements as had been predicted. ***Podosordaria*** is thus redefined to include only taxa with anamorphs that are ***Xylaria***-like, more or less assignable to ***Geniculosporium***. Taxa with disarticulating anamorphic elements, assignable to ***Lindquistia***, are assigned to ***Poronia***. Two new species, ***Podosordaria elephanti*** and ***P. muli***, are described. The following new combinations are proposed: ***Podosordaria entosulphurea***, ***Poronia australiensis***, and ***Poronia ingii***.

Key words: ***Geniculosporium***, ***Lindquistia***, ***Poronia***, systematics, ***Xylaria***, Xylariaceae

Podosordaria Ellis & Holw. was established on ***P. mexicana*** Ellis & Holw.; material of the type species was collected from cow dung in Mexico (Holway, 1897). ***Podosordaria*** has been considered as separate from ***Poronia*** Willd. primarily on its more rounded stromatal heads and mammiform perithecia (Krug and Cain, 1974; Krug and Jeng, 1995). ***Podosordaria*** was a monotypic genus until Dennis (1957) expanded it with the addition of three more species; one of them was ***Podosordaria leporina*** (Ellis & Everh.) Dennis [≡ ***Poronia leporina*** Ellis & Everh.], which was studied in culture by Koehn and Cole (1975) and Rogers (1973). This species has disarticulating conidiophores of the type found in all investigated ***Poronia*** species (Jong and Rogers, 1969; Stiers et al., 1973; and refs. therein), now accommodated in the hyphomycetous genus ***Lindquistia*** Subram. & Chandrashekara. Based on their studies (Koehn, 1971; Koehn and Cole, 1975), Koehn and Cole argued that ***P. leporina*** is a ***Poronia*** and should be considered as such. Rogers (1973) did a cytological study of ***Podosordaria leporina*** and discussed the close cytological resemblance to previously studied ***Poronia*** species. He noted, however, that ascospores of ***Poronia oedipus*** (Mont.) Mont. and ***Poronia punctata*** (L.: Fr.) Fr. are binucleate and quadrinucleate, respectively, whereas those of ***Podosordaria leporina*** become binucleate via a mitosis, then mature in a uninucleate condition following the disintegration of one nucleus (Rogers, 1973). Rogers (1973) was inclined to accept ***Podosordaria*** on the basis of the ascospore nuclear pattern in ***Podosordaria leporina*** until other taxa could be studied. Krug and Cain (1974) accepted ten species of ***Podosordaria*** primarily on stromatal features. Over time ***Podosordaria*** came to embrace coprophilous and plant debris-inhabiting fungi with rounded fertile heads, distinct perithecial contours, and a ***Lindquistia*** anamorph, i.e., as in ***Podosordaria leporina***. Most species now accepted in ***Podosordaria*** , however, have not been cultured and the anamorphs are unknown.

Recently, one of us (FSM) collected material of ***Podosordaria mexicana*** from horse dung in Mexico. Cultures initiated from ascospores produced both the anamorph and the teleomorph. As will be shown herein, the anamorph does not disarticulate; it is not assignable to ***Lindquistia***. Because we consider the anamorph to be of paramount importance in defining xylariaceous genera, the generic circumscription of ***Podosordaria*** is altered on the basis of the type species. Two additional species are described as ***Podosordaria*** and some taxa formerly considered to be ***Podosordaria*** are transferred to ***Poronia***.

MATERIALS AND METHODS

Cultures were initiated from ascospore masses transferred by needle or forceps from perithecia and spotted on plates of SMEA media (Kenerley and Rogers, 1976) or 2% Difco Potato Dextrose Agar with 5g/l yeast extract (PDYA). Colonies from these media were transferred, along with underlying agar, to plates of 2% Difco Oatmeal Agar (OMA). Observations of both anamorphs and teleomorphs are from this medium. In the case of ***Podosordaria mexicana***—the only taxon to produce a mature teleomorph in culture—single ascospore cultures were initiated in order to determine if the fungus is homothallic or heterothallic.

Cytological observations were made via brightfield microscopy on Giemsa-stained material (Rogers, 1965) or via darkfield fluorescence microscopy on material stained with Hoescht 33258 (Ju and Rogers, 1994 and refs. therein).

TAXONOMIC PART

Podosordaria mexicana Ellis & Holw. *apud* Holw., Bot. Gaz. 24: 37. 1897.
Figs. 14-21

Stromatal heads rounded, up to 1.5 mm diam on narrowed furrowed stipe up to 4 mm long x up to 1 mm diam, externally tawny with darker ostioles, becoming blackish with age, internally white. Texture fairly soft. Surface roughened with perithecial contours, each stroma bearing 2-6 perithecia. Perithecia ca. 0.8 mm diam. Ostioles finely papillate. Asci eight-spored, the spores mostly in biseriate arrangement, cylindric-clavate, 220-270 μm total length x 25-35 μm broad, the spore-bearing part 200-230 μm long, the stipe 15-50 μm long, with apical ring bluing in Melzer's iodine reagent, dome-shaped, ca. 7.5 μm high x 12 μm broad. Ascospores nearly black, unicellular, ellipsoid to slightly inequilateral, with a heavy gelatinous sheath, but with epispore smooth, 26-32(-40) x (12-)16-18(-21) μm, with germ slit less than spore-length (Figs. 16, 19) or conspicuously short. Paraphyses abundant, septate, sparingly branched, 4.5-10 μm diam, longer than asci.

SPECIMENS EXAMINED: MEXICO: Morelos, Cuernavaca, 23.IX.1897, Holway, on cow dung (NY, HOLOTYPE); Tamaulipas, Victoria Municipality, Las Minas, X.1996, San Martín, F. 6013T (CULTURED), on horse dung (WSP; ITCV); Nayarit, North of Tepic, 16.VIII.1960, Cain, R. F., on burro dung (TRTC 45694).

Colonies on OMA at ca. 20°C under 12 h fluorescent light growing restrictedly, covering 3 cm diam in 3 wk, appressed, yellowish to pinkish with diffusing orange pigment, becoming blackened beneath. Coremia up to 3 mm high x < 1 mm broad, composed of parallel hyphae, and discoid sporodochia 1-2 mm diam produced in profusion in 2-3 wk, bearing sparingly branched conidiophores with slightly swollen conidiogenous cells producing conidia holoblastically. Conidia hyaline, somewhat wedge-shaped to long ellipsoid to somewhat allantoid or irregular, with flattened bases, 7-11(-13) x 2.5 μm.

Teleomorphic stromata produced among anamorphic structures within 3 wk, many forcibly ejecting ascospores in 5 wk. Teleomorph as described above.

NOTES: Asci of ***Podosordaria mexicana*** originate from typical croziers. Ascospores are typically 4-nucleate, but less commonly 5-7 nucleate (Figs. 14, 15), before the wall becomes too opaque for further cytological observations. Limited observations indicate that the chromosome number is n=7, but we do not consider this to be firmly established.

Based upon production of fertile stromata in cultures of single ascospore origin, the fungus is homothallic.

Anamorphic synnemata can be considered as indeterminate because they continue to grow after sporulation begins; the hyphal system is monomitic; the sporulating zone is divergent to apparently random (terminology of Seifert and Okada, 1990).

Podosordaria muli J. D. Rogers, Y.-M. Ju, & F. San Martín, *sp. nov.*
Figs. 1, 4, 5, 8, 10, 12

Stromata subsessilia vel stipitata, indivisa, in toto usque ad 4 mm alta. Pars fertilis subglobosa, 1-3 mm diam, prominentibus tumulis peritheciorum, uno vel aliquot peritheciis praedita. Stipites abrupti, torti, 0.2-0.4 mm diam. Exterior partis fertilis brunnea, stipites brunnei; interior stromatis alutacea. Textura mollis. Perithecia 0.3-0.9 mm diam. Ostiola papillata. Asci octospori ascosporis uniseriatis vel biseriatis, stipitati, 133-180 μm longitudine tota x 7-11 μm crassi, partibus sporiferis 66-80 μm longitudine, annulo apicali in liquore iodato Melzeri cyanescente, plus minusve cubico, 2.2 x 2.2 μm. Ascosporae brunneae, unicellulares, ellipsoideo-inequilaterales vel plus minusve lunatae, apicibus plus minusve angustatis, interdum appendice non cellulari praeditae, leves, 12-13.5 x 4.5-6 μm, rima germinativa recta ventrali longitudine minus quam spora integra. Paraphyses abundae.

Stromata subsessile to stipitate, unbranched, up to 4 mm high. Fertile part subglobose, 1-3 mm diam, with distinct perithecial elevations, bearing 1-several perithecia. Stipes abrupt, twisted, 0.2-0.4 mm diam. Exterior of fertile part dull brown, stipes brown; interior tan. Texture soft. Perithecia 0.3-0.9 mm diam. Ostioles papillate. Asci eight-spored, the spores arranged in uniseriate or biseriate manner, stipitate, 133-180 μm total length x 7-11 μm broad, the spore-bearing part 66-80 μm long, with apical ring bluing in Melzer's iodine reagent, more or less cuboid, 2.2 x 2.2 μm. Ascospores brown, unicellular, ellipsoid-inequilateral to ± crescentic, with mostly narrow ends, occasionally bearing a noncellular appendage, smooth, 12-13.5 x 4.5-6 μm, with straight germ slit less than spore-length on flattened side. Paraphyses abundant.

Colonies on OMA at ca. 20°C under 12 h fluorescent light reaching 4 cm diam on 9 cm diam Petri plate in 2 wk, with mycelium thick, fairly smooth, pink. Stromata (synnemata) narrow, conic, 1-4 mm high x < 1mm diam at center of plate, at first pinkish to grayish, becoming blackened at base, bearing anamorph. Conidiophores hyphoid, indeterminate in length x ca. 4 μm, bearing conidiogenous cells in the manner of teeth on a comb. Conidiogenous cells more or less botuliform, (6-) 10-35 x 4-6 μm, producing conidia holoblastically, with apices often swollen or scarred indicating repeated conidial production. Conidia hyaline, smooth, subcylindrical to fusoid, equilateral to somewhat inequilateral, often attenuated and flattened at secession end, 11-16 x 1.5-2 μm.

Teleomorphic stromata typical of naturally-produced ones formed, but not producing ascospores.

SPECIMEN EXAMINED: MEXICO: Tamaulipas, Jaumave Municipality, Julilo-Malacate hike Rd., 17.VIII.1995, San Martín, F. 8014T, on ***Mulus*** (mule) dung; cultured (ITCV, HOLOTYPE; WSP, ISOTYPE).

NOTES: This fungus resembles ***P. elephanti*** in general morphology and in occurring on dung. It differs in lacking yellow subsurface stromatal granules, in larger ascospores, in larger conidia, in the kind of dung occupied, and in its geographical distribution as presently understood. It resembles ***Podosordaria hircina*** (Tai & Wei) Krug & Cain (Krug and Cain, 1974), differing from it in lighter ascospore color, longer asci, substrate, and geographical distribution. As far as we know, ***P. hircina*** species has not been cultured. According to Krug (personal communication) type material of ***P. hircina*** is probably no longer extant.

Podosordaria elephanti J. D. Rogers & Y.-M. Ju, *sp. nov.*

Figs. 2, 3, 6, 7, 9, 11, 13

Stromata stipitata, indivisa, in toto usque ad 3 cm alta. Pars fertilis subglobosa vel conica, 3-5 mm alta x 2-4 mm diam, plus minusve prominentibus tumulis peritheciorum, peritheciis numerosis praedita. Stipites abrupti, striati, 0.5-1.25 mm diam. Exterior partis fertilis aenea ostiolis nigris, sub superficie granulis aurantiacis conspersa, granulis luteis in KOH dissolutis; sub strato granulorum alba; stipes aeneus. Textura mollis. Perithecia 0.4-0.5 mm diam. Ostiola papillata. Asci octospori, stipitati, 88-133 μm longitudine tota x 5-7 μm crassi, partibus sporiferis 60-70 μm longitudine, annulo apicali in liquore iodato Melzeri cyanescente, plus minusve cuneato, 2.9 μm alto x 2.2 μm lato. Ascosporae brunneae, unicellulares, ellipsoideo-inequilaterales apicibus plus minusve angustatis, saepe vagina exili praeditae, leves, 9-10.5 x 4.5-5 μm, rima germinativa recta ventrali longitudine minus quam spora integra. Paraphyses sparsae.

Stromata stipitate, unbranched, up to 3 cm high. Fertile part subglobose to conic, 3-5 mm high x 2-4 mm diam, with more or less prominent perithecial elevations, bearing numerous perithecia. Stipes abrupt, striate, 0.5-1.25 mm diam. Exterior of fertile part bronze-colored with black ostioles, with orange granules just beneath surface that yield a yellow pigment in KOH and white beneath; stipe bronze-colored. Texture soft. Perithecia 0.4-0.5 mm diam. Ostioles papillate. Asci eight-spored, stipitate, 88-133 μm total length x 5-7 μm diam, the spore-bearing part 60-70 μm long, with apical ring bluing in Melzer's iodine reagent, more or less cuneate, 2.9 μm high x 2.2 μm broad. Ascospores brown, unicellular, ellipsoid-inequilateral, mostly with narrow ends, often with a thin sheath, smooth, 9-10.5 x 4.5-5 μm, with germ slit slightly less than spore-length on the flattened side. Paraphyses not abundant.

Colonies on OMA at ca. 20°C under 12 h fluorescent light not covering 9 cm diam Petri plate in 4 wk, with mycelium dense, appressed, pale yellowish orange, zonate. Stromata of two types, the first-formed narrow, conic, 1-2 mm high x less than 1 mm diam, whitish to gray and bearing conidia; the second-formed pulvinate to cylindrical, copper brown, not bearing conidia. Conidiophores indeterminate, bearing conidiogenous cells in irregular false whorls or arranged in the manner of teeth on a comb. Conidiogenous cells more or less botuliform, 10-14 x 3-4 μm, producing conidia holoblastically. Conidia hyaline, smooth, subcylindrical, sometimes somewhat inequilateral, flattened at secession end, (6.5-) 8-9 x 2-2.5 μm.

Teleomorphic stromata formed, but not producing ascospores.

SPECIMEN EXAMINED: THAILAND: Chacoensao Province, Khao Ang Ru Nai Wildlife Preserve, 6.VIII.1995, Bandoni, R. J. & A. A. and Flegel, T. W., 11,130, on dung of ***Elephantus*** (elephant); cultured (WSP, HOLOTYPE; Mahidol University, ISOTYPE).

NOTES: This fungus resembles ***X. entosulphurea*** J. D. Rogers, F. San Martín, & Y.-M. Ju (Rogers et al., 1996) in gross morphology, in the yellow subsurface granules, and in producing both conidium-bearing structures and aconidial (probably teleomorphic) structures in culture. That fungus is transferred to ***Podosordaria*** elsewhere herein. It differs in occurring on dung, in its smaller ascospores, and in its distribution as presently understood.

DISCUSSION

Based upon our studies of ***Podosordaria mexicana***, the type species of the genus, ***Podosordaria*** differs from ***Poronia*** primarily in producing a ***Xylaria***-like anamorph devoid of disarticulating elements. Such anamorphs can be assigned to ***Geniculosporium*** Chesters & Greenh. rather than to ***Lindquistia***. It would be possible to place ***Podosordaria*** into synonymy with ***Xylaria*** or to erect a new genus to accommodate those taxa that resemble ***Podosordaria*** in their rounded fertile heads, but that are known to have a ***Lindquistia*** anamorph. Our solution here is to emend the circumscription of ***Podosordaria*** on the basis of the type species and to transfer ***Podosordaria***-like taxa known to have ***Lindquistia*** anamorphs to ***Poronia***. Further expansion of ***Xylaria***—itself in great need of attention—seems unnecessary and counterproductive. Dennis (1957), in expanding ***Podosordaria*** and discussing ***Poronia***, recognized the difficulties in separating these genera from ***Xylaria***. Our emphasis on the anamorph makes separation of taxa of ***Poronia*** from both ***Podosordaria*** and ***Xylaria*** unequivocal when an anamorph is known. The separation of ***Podosordaria*** from ***Xylaria*** is based primarily on the gross morphology of teleomorphic stromata and on the production of both anamorphic and teleomorphic stromata in cultures of the former. Presently, we firmly accept in ***Podosordaria*** and ***Poronia*** only taxa with anamorphs known by culturing. The significance of ascospore nucleation patterns in generic considerations awaits more studies. It is perhaps noteworthy that a number of coprophilous pyrenomycetes of different taxonomic affinities have binucleate or multinucleate ascospores.

Podosordaria Ellis & Holw. *emend* J. D. Rogers, Y.-M. Ju, & F. San Martín

Stromata rounded, subglobose, or more or less discoid, stipitate or sessile, fimicolous or less commonly lignicolous. Fertile heads bearing one to many perithecia. Asci unitunicate, with a distinct iodine-positive ascus ring. Ascospores brown, more or less ellipsoid and equilateral to inequilateral, usually with a more or less conspicuous gelatinous sheath, with a more or less conspicuous germ slit. Paraphyses usually present to abundant. Anamorph, if present, ***Geniculosporium***-like, often borne on separate coremia or sporodochia that do not develop into a teleomorph. Disarticulating hyphae, conidiophores, or other elements lacking. Teleomorphic or putative teleomorphic stromata produced among anamorphic structures.

NEW COMBINATIONS AND REDISPOSITIONS

Podosordaria entosulphurea (J. D. Rogers, F. San Martín, & Y.-M. Ju) J. D. Rogers, Y.-M. Ju, & F. San Martín, *comb. nov.*
Basionym: ***Xylaria entosulphurea*** J. D. Rogers, F. San Martín, & Y.-M. Ju, Mycotaxon 58: 483. 1996.

Poronia australiensis (Laessøe, C. A. Pearce, & K. D. Hyde) J. D. Rogers, Y.-M. Ju, & F. San Martín, *comb. nov.*
Basionym: **Podosordaria australiensis** Laessøe, C. A. Pearce, & K. D. Hyde, Mycol. Res. 100: 1505. 1996.

Poronia ingii (J. D. Rogers & Laessøe) J. D. Rogers, Y.-M. Ju, & F. San Martín, *comb. nov.*
Basionym: **Podosordaria ingii** J. D. Rogers & Laessøe, Mycotaxon 54: 435. 1992.

Poronia jugoyasan Hara, Trans. Mycol. Soc. Japan 2: 16. 1960.
Synonym: **Podosordaria jugoyasan** (Hara) Furuya & Udagawa, Trans. Mycol. Soc. Japan 17: 254. 1977.

Poronia leporina Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia 1890: 229. 1890.
Synonym: **Podosordaria leporina** (Ellis & Everh.) Dennis, Kew Bull. 1957: 306. 1957.

Few **Xylaria** species have been reported as dung-inhabitants and even fewer proven to be **Xylaria** on the basis of culture. Wehmeyer (1942) described **X. coprophila** Wehmeyer from porcupine dung. Type material [CANADA: Nova Scotia, Pictou Co., New Glasgow Rd., VIII.1931, leg. Smith, A. H. 1490, det. Wehmeyer, L. E. 9072, on porcupine dung (DAOM 120269)] indeed has stromata that are typically **Xylaria**, but we accept it only provisionally without anamorphic data. **Xylaria chardoniana** (Toro) J. H. Mill., **X. pedunculata** (Dicks.) Fr., and **X. tulasnei** Nitschke likewise are known from dung (Dennis, 1956). Dennis (1957) later moved the latter two taxa into **Podosordaria**, but without anamorphic data. Krug and Cain (1974) and Krug and Jeng (1995) accepted these dispositions. Paden (1978) proved by culturing that **Poronia pileiformis** (Berk.) Fr. is, in fact, not a **Poronia** and reinstated it as **X. pileiformis** (Berk.) Curr. We accept this disposition for the present.

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FIGURE LEGENDS

Figs. 1-9. ***Podosordaria muli*** and ***P. elephanti***. 1. ***P. muli***. Fertile part showing perithecial elevations and ostioles. Portion of prostrate stipe visible beneath, X16. 2 and 3. ***P. elephanti***. 2. Stromata, X1.5. 3. Fertile part of stroma showing perithecial elevations and ostioles, X10. 4 and 5. ***P. muli***. 4. Ascospore, X3135. 5. Ascospore showing germ slit, X3135. 6 and 7. ***P. elephanti***. 6. Ascospore showing germ slit, X3135. 7. Ascospores, X3135. 8. ***P. muli***. Ascus apical ring, X3135. 9. ***P. elephanti***. Ascus apical ring, X3135.

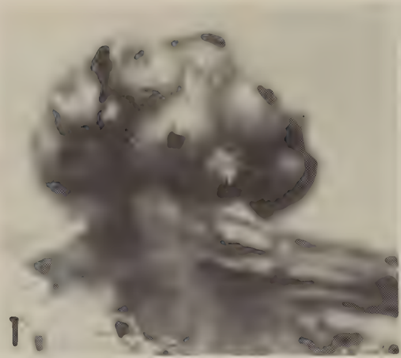
Figs. 1-3 by photomacrography. Figs. 4-9 by bright field microscopy. Figs. 8 and 9 from material mounted in Melzer's iodine reagent.

Figs. 10-16. ***Podosordaria muli*** and ***P. elephanti*** anamorphs and ***P. mexicana*** ascospores. 10. ***P. muli***. Conidiophore bearing conidiogenous cells in comb-like configuration. Conidium (C) on conidiogenous cell. Scars on conidiogenous cell (arrow), X1980. 11. ***P. elephanti***. Whorl of conidiogenous cells, X1320. 12. ***P. muli***. Conidia, X1650. 13. ***P. elephanti***. Conidia, X1320. 14-16. ***P. mexicana***. 14. Four-nucleate immature ascospore, X1333. 15. Six-nucleate immature ascospore, X1333. 16. Mature ascospore showing germ slit, X1100.

Photographs 10-13 and 16 by differential interference contrast microscopy of unstained material. Figs. 14 and 15 from Hoescht 33258-stained material by darkfield fluorescence microscopy.

Figs. 17-21. ***Podosordaria mexicana***. 17. Stromata, X10. 18. Ascus apical ring. 19. Ascospores with a gelatinous sheath. 20. Conidiophores arranged in a dense palisade. 21. Conidia.

The scale bar represents 10 μm.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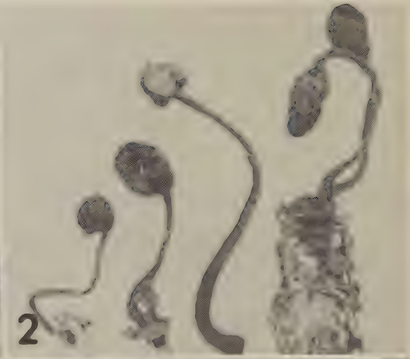
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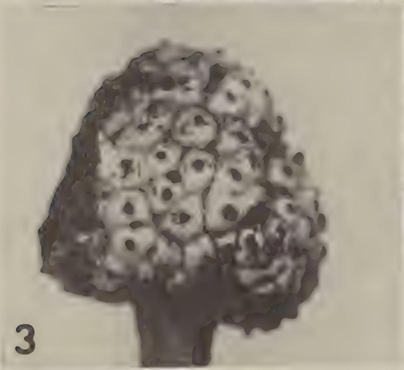
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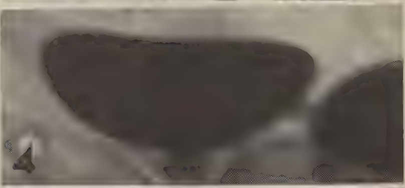
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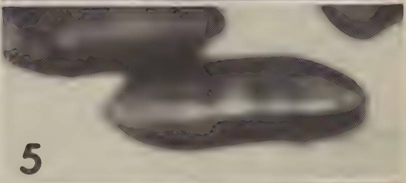
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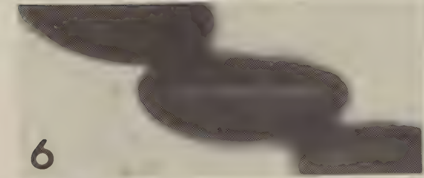
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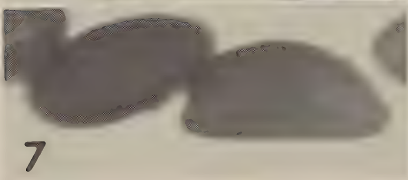
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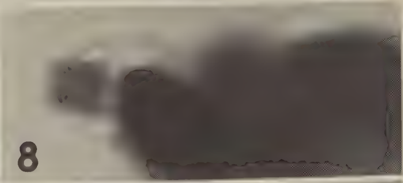
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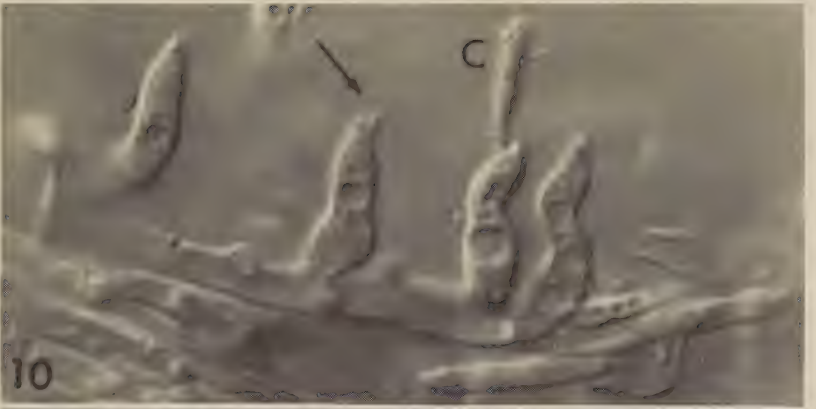

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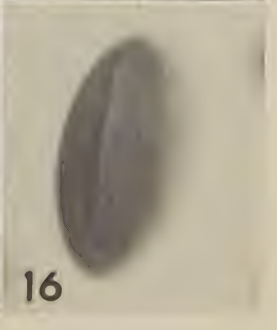

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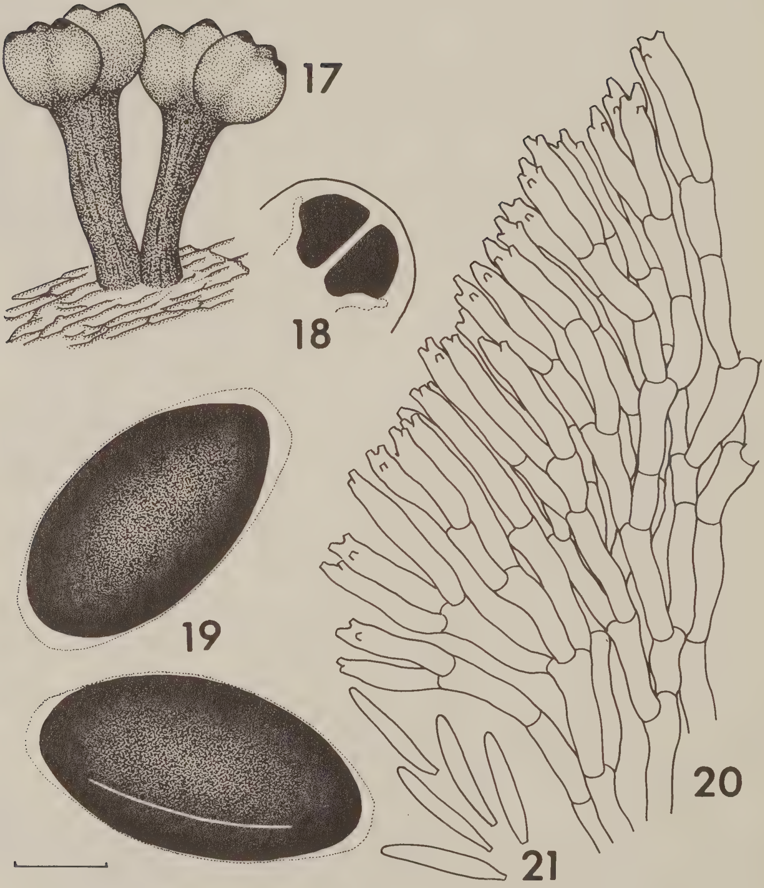

MYCOTAXON

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A PRELIMINARY DISCOMYCETE FLORA OF MACARONESIA: PART 18, LEOTIALES*[1]

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> "There are some remedies worse than the disease."
> Publilius Syrus [tr. Darius Lyman]
> MAXIM 301

Order LEOTIALES
Family LEOTIACEAE Corda 1842 emend. nov.

Notes: We are using the family name Leotiaceae in nearly its original, very narrow (monogeneric) sense, segregated from the Geoglossaceae by Corda because of the gelatinous nature of the ascocarps. We now recognize the order Leotiales for this one family and for only four included genera, *Leotia,* the structurally similar but unstalked genus *Neobulgaria,* the sessile or subsessile or short-stipitate genus *Pezoloma,* and the broadly sessile genus *Geocoryne.* It is possible that the genera of the Calloriopsideae Pfister, unknown as yet from Macaronesia, *Calloriopsis* Syd. & P. Syd. and *Gelatinopsis* Rambold & Triebel (≡ *Micropyxis* Seeler), may also belong here as strongly reduced members of the family. The type genus, *Leotia,* differs in the construction of excipular tissues (Moore, 1965) and morphology of ascal apical apparatus (Verkley, 1994) from the rest of the genera of Leotiaceae in the sense of Korf (1973) and together with the other three (or five) genera is apparently far distant phylogenetically from the fungi treated in this flora as members of the Helotiales. The family name Leotiaceae was adopted in a very broad sense by Korf (1973), who was followed by most authors. For the remaining majority of the genera and species included by such authors in the Leotiaceae, we now use the family name Helotiaceae Rehm, *nom. conserv. prop.* (Korf, Iturriaga, & Lizoň, *Taxon* **45:** 683-684, 1996).

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* The parts of this flora will appear in irregular order. Offprints of this part may be requested from the Plant Pathology Herbarium at Cornell University. For special features of this flora, see *Mycotaxon* **13:** 144. 1981.

The Leotiaceae, as understood here, and thus the Leotiales, are characterized by having:

- a well-developed gelatinized textura intricata in the outer ectal excipulum (which may be restricted to a pad at the base of the apothecium),
- an inner ectal excipulum of non-gelatinized textura porrecta/ prismatica, and
- a medullary excipulum of textura intricata (gelatinized or non-gelatinized).

KEY TO THE KNOWN MACARONESIAN GENERA

1. Apothecia turbinate to stalked, with gel tissues inside a cylinder of non-gelatinized cells, and an outer layer of gel tissues reaching or nearly reaching the margin, on soil or wood 2

1´. Apothecia sessile, discoid or lenticular, rarely short-stipitate, with an outer basal pad of gelatinized hyphae in gel, not reaching the margin, with all remaining tissues not in a gel, the ectal excipulum of large celled textura prismatica to globulosa, the medullary excipulum and subhymenium of textura intricata, on wet wood, rotted leaves, and detritus . . . . **Pezoloma**

2(1). Inner layer of the ectal excipulum of long-celled textura porrecta, outer gel layer rarely reaching the margin, medullary excipulum of textura intricata in a not very evident gel, apothecia sub-turbinate to broadly sessile to applanate, on soil . . . . . **Geocoryne**

2´(1). Inner layer of the ectal excipulum of short-celled textura angularis to textura prismatica, outer gel layer reaching the margin 3

3(2´). Apothecia long-stipitate, capitate, on soil . . . . **Leotia**

3´(2´). Apothecia turbinate, often aggregated and thus pseudo-stipitate, on wood . . . . **Neobulgaria**

PEZOLOMA Clem. 1909

≡ [*Pezoloma* Clem. & E. S. Clements, Crypt. Form. Colorad. 292, 1907, nom. nud.]
= *Ciliatula* Velen. 1922 [fide Pouzar, 1972]
= *Sphagnicola* Velen. 1934 [fide Korf, 1971]
= *Pseudodiscinella* Dennis 1956 [fide Dennis & Korf, 1958]

Notes: *Pezoloma* was erected for helotioid discomycetes characterized by having non-hairy, sessile apothecia with a toothed margin and hyaline 1-celled spores. Besides its brief description (in a key) and diagnosis (*Cyathicula* sessilis) no additional data were published either in the original or expanded editions of the *The Genera of Fungi* (Clements, 1909; Clements & Shear, 1931). Clements based his genus on *Pezoloma griseum* Clem., but no description of this species is available. Dennis (1978) separated the genus from *Ombrophila* by "having a flesh of large thin-walled cells covered by a gelatinous sheath of slender hyphae embedded in mucilage" and the only more complete description (though not detailed) was published by Sharma and Thind (1986). More than ten species have been referred to this genus (including that described here). *Pezoloma*, as understood here, may be distinguished by having apothecia sitting in a mass of well-developed basal gel. The gel layer covers only the lower part of the ectal excipulum.

One known Macaronesian species

1. **Pezoloma iodopedis** Korf, Lizoň, & Iturriaga, **sp. n.**

Apothecia subsessilia, avellanea vel brunneola, ad 0.5–0.75 mm diam. Excipulum ectale ex textura prismatica vel globulosa formatum, ad marginem ex textura prismatica formatum; stratum externum gelatinosum non nisi basem receptaculi obtegens, solutione Melzeri caerulescens. Excipulum medullare et subhymenium ex textura intricata. Asci 70–93 (–103) x 4.0–13 µm, poro solutione Melzeri caerulescenti. Ascosporae irregulariter ovoidea, valde cyanophilicae, 7.7–12.3 x 3.1–5.4 µm.
Holotypus: CUP-MM 679: La Palma, Canary Islands, Spain.

APOTHECIA subsessile or clearly short-stipitate with a basal gel pad, when dry cupulate, margin involute, slightly striate, receptacle beige to yellowish-reddish brown, 0.5-0.75 mm diam; when rehydrated discoid, receptacle and disc creamy-white, 1-1.5 mm diam. ECTAL EXCIPULUM of textura prismatica to textura globulosa, 23–46 µm thick at flanks, cells 7.7–20 x 5.4–11.5 (–17) µm, at margin of textura prismatica, 6.0–28 µm thick, cells 7.7–13 x 3.1–4.6 µm. Hyphae parallel to surface of apothecium in the innermost ectal excipulum, outer hyphae turning outwards at a right angle to the receptacle surface, and sometimes terminal cells becoming loose and forming hair-like processes, particularly at the base of receptacle at the gel pad level. MEDULLARY EXCIPULUM and SUBHYMENIUM of textura intricata not immersed in gel. Dextrinoid reaction of hyphae, cells and spores observed only in fresh apothecia, not present in dry specimens. Stipe-like prolongation of receptacle concolorous with receptacle, 0.25-0.5 x 0.3-0.5 mm, built of the same tissues, ectal excipulum of textura angularis to textura globulosa. Outer gel layer of textura intricata, J+ blue in Melzer's Reagent, 18–75 µm thick, covering stipe base, widening outwards and forming a basal pad of gelatinized hyphae, cyanophobic. ASCI clavate with a short base, thick-walled, arising from croziers, (6–)8-spored, 70–93 (–103) x 4.0–13 µm; pore J+ blue (without KOH pretreatment). ASCOSPORES irregularly ovoid to lacrimoid, with 2 small polar guttules, uniseriate to irregularly biseriate, some seen germinating inside the ascus, 7.7–12.3 x 3.1–5.4 µm. PARAPHYSES simple, septate, 2.3–3.8 µm diam., enlarged at the apex, 3.1–4.6 µm diam.

RECENT TAXONOMIC TREATMENTS:

None.

PREVIOUS MACARONESIAN RECORDS:

None.

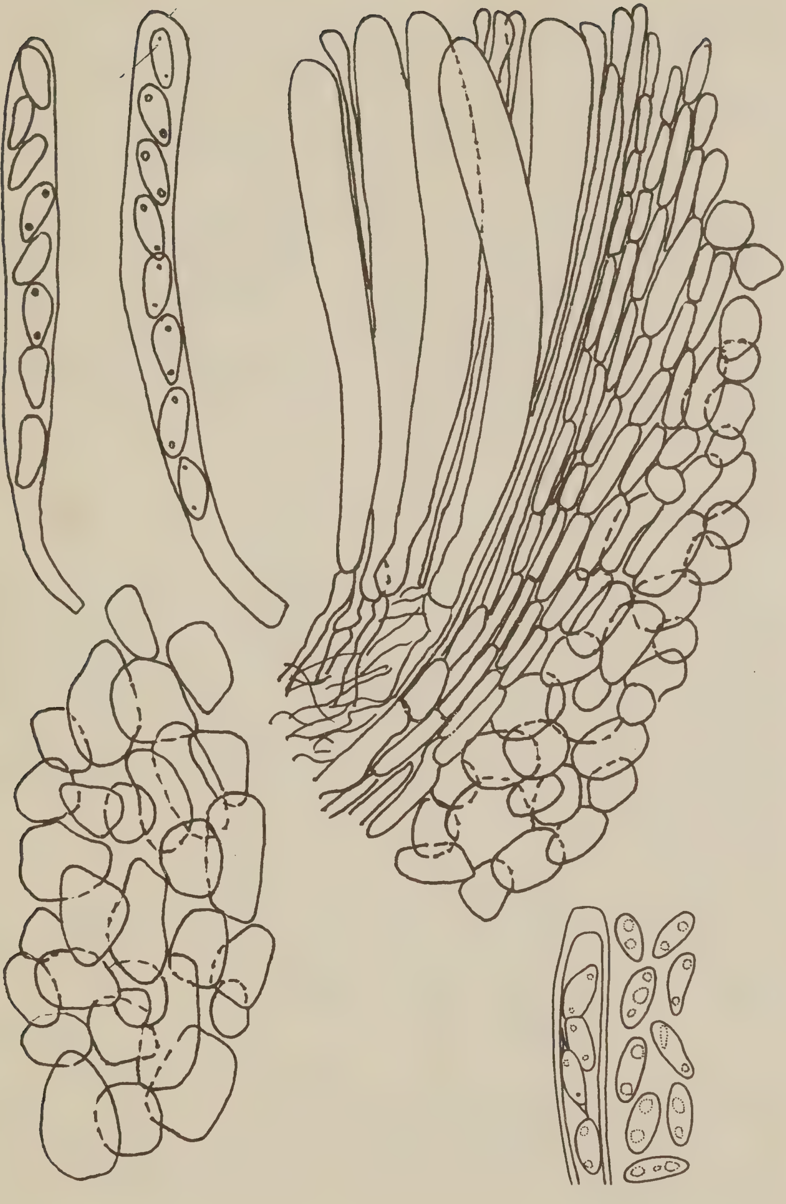
HOLOTYPE:

Spain, Canary Islands, La Palma, on wet wood. Los Tilos, leg. R. P. Korf, W. C. Denison, L. M. Kohn, & M. A. Sherwood, 14.1.1976, CUP-MM 679.

KNOWN MACARONESIAN DISTRIBUTION

MADEIRA.

Madeira. CUP-MM 2429 (paratype).



P. iodopedis, 2 asci, median section at the margin, ectal excipular cells, 1 ascus apex, and 9 ascospores, all CU-MM 679, x 1000.

CANARY ISLANDS
La Palma. CUP-MM 679 (holotype).

SUBSTRATA:
On wet wood and on submerged wood [twigs].

Notes: The specific epithet refers to the blueing of the basal pad when whole apothecia or median sections thereof are mounted in Melzer's Reagent. The structure of the apothecia of *Pezoloma iodopedis* recalls the genus *Geocoryne,* which differs in having much longer ectal excipular cells and in occurrence on soil. The species has also been frequently collected in North America (Korf, unpublished). When a short stipe is formed, the gel pad is only at the base of the stipe.

GEOCORYNE Korf 1978

Notes: *Geocoryne* has a similar structure of the outer ectal excipulum to other members of the family. Even though the inner ectal excipulum is composed of textura porrecta the genus seems to be more closely related to the genera of Leotiaceae than to those genera of Helotiaceae which have gelatinized apothecia but lack a gelatinized outer ectal layer (e.g., *Ascocoryne, Ascotremella, Bulgaria,* and *Ombrophila*). The medullary excipulum is of textura intricata "immersed in a not particularly evident gel matrix" (Korf, 1978).

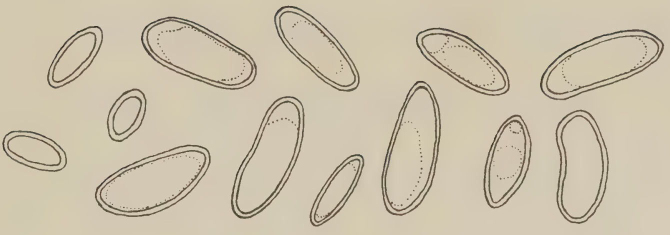
One known Macaronesian species

1. **Geocoryne variispora** Korf in Korf & al., Mycotaxon **7:** 146, 1978.

RECENT TAXONOMIC TREATMENT:
Korf & al. (1978).

PREVIOUS MACARONESIAN RECORDS:
††Bañares & Beltrán (1982), †Beltrán (1980), **Ing (1990), *Korf & al. (1978).

TYPE LOCALITY:
Tenerife, Canary Islands, Spain.



G. variispora, 13 ascospores; CUP-MM 5, x 100.

KNOWN MACARONESIAN DISTRIBUTION

CANARY ISLANDS.

Tenerife. † ††† *CUP-MM 3 (holotype; isotypes: FH, K, TFC)); *CUP-MM 5, (paratype, topotype), *CUP-MM 20 (paratype), *CUP-MM 43 (paratype; isoparatypes: OSC, TFC), *CUP-MM 129 (paratype; isoparatypes: OSC, TFC), *CUP-MM 214 (paratype, topotype), *CUP-MM 215 (paratype, topotype), *CUP-MM 419 (paratype; isoparatypes: OSC, TFC), *CUP-MM 420 (paratype; isoparatype: BHUPP), *CUP-MM 426 (paratype), *CUP-MM 427 (paratype), *CUP-MM 436 (paratype), *CUP-MM 453 (paratype), CUP-MM 548 (paratype), *CUP-MM 1139 (paratype; isoparatype: O), *CUP MM 1145 (paratype; isoparatype: O), *CUP-MM 1149 (paratype; isoparatype: O), *CUP-MM 1208 (paratype), *CUP-MM 1282 (paratype; isoparatype: TFC), **CUP-MM 2697, **CUP-MM 2701, **CUP-MM 2750.

Gomera. †† *CUP-MM 1161 (paratype; isoparatype: O), *CUP-MM 1163 (paratype; isoparatype: O), **CUP-MM 2681, **CUP-MM 2683, **CUP-MM 2690.

MADEIRA.

Madeira. CUP-MM 2441.

SUBSTRATA:

On soil, on naked soil, on mossy soil, in a footpath, and on possibly burned soil.

LEOTIA Pers. 1794
= *Neocudoniella* S. Imai 1941

Key to the known Macaronesian species

1. Ascocarp pileus deep viridous green, stipe similar in color or lighter green .... **1. L. atrovirens**
1´. Ascocarp pileus and stipe ochraceous, sometimes especially in age with olivaceous tints .... **2. L. lubrica**

Notes: Important taxonomic treatments of the genus include those by Durand (1908), Imai (1941), Nannfeldt (1942), Tai (1944), and Mains (1956).

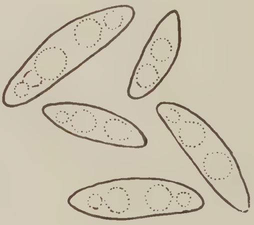
1. Leotia atrovirens Pers., Mycol. eur. **1:** 202. 1822 : Fries, Syst. mycol. **2:** 30. 1822.

= *Leotia chlorocephala* Schwein., Syn. fung. Carol. suppl. 114. 1822.

RECENT TAXONOMIC TREATMENTS:
Mains (1956), Gremmen (1960).

PREVIOUS MACARONESIAN RECORD:
*Dybhavn (1990)

TYPE LOCALITY:
Vosges, France.



L. atrovirens,
5 asco-spores,
CUP -MM 2776, x 1000.

KNOWN MACARONESIAN DISTRIBUTION

MADEIRA
Madeira. *CUP-MM 2776 (O).

SUBSTRATA:
[On soil] In beech forest.

Notes: Imai (1941) treated this just as a form of *Leotia lubrica*. The fungus illustrated by Breitenbach & Kränzlin (1984) under this name is very probably *Microglossum viride*.

2. **Leotia lubrica** (Scop. : Fr.) Pers., Neues Mag. Bot. **1:** 97. 1794.

RECENT TAXONOMIC TREATMENT:
Breitenbach & Kränzlin (1984)

PREVIOUS MACARONESIAN RECORD:
†Bañares & al. (1991)

TYPE LOCALITY:
Slovenia, "Carniola."

KNOWN MACARONESIAN DISTRIBUTION

CANARY ISLANDS
Las Palmas. †

SUBSTRATA:
On soil under *Castanea sativa.*

NEOBULGARIA Petrak 1921

Notes: Petrak's delimitation (Petrak, 1921) of his new genus from *Ombrophila* is insufficient. These genera clearly differ in excipular structure: *Neobulgaria* has an outer ectal excipulum of thin hyphae immersed in a gel while in *Ombrophila* the ectal excipulum is of textura prismatica with brick-shaped cells, lacking gel on the outer surface of the apothecia (Korf, 1973). A non-gelatinized ectal excipulum also is present in the genus *Ascotremella* (see Gamundí & Dennis, 1969), which has frequently been confused with *Neobulgaria* (e.g., by Korf, 1973). Both *Ombrophila* and *Ascotremella* are placed by us in the Helotiaceae.

Only a few taxa have been treated in *Neobulgaria: N. lilacina* (Wulfen : Fr.) Dennis, *N. pura* (Fr.) Petrak, *N. pura* f. *foliacea* (Bres.) Gamundí & Dennis, and *N. premnophila* L. & R. Roll-Hansen are well deliminated. *N. caliciformis* Killerm., *N. margaritoides* Killerm., *N. parvata* V. P. Tewari & Ram N. Singh and *N. rupicola* V. P. Tewari & Ram N. Singh need comparative studies to determine their taxonomic status. We treat *N. undata* (W. G. Sm.) Spooner & Y. J. Yao as a probable synonym of *N. pura.*

One known Macaronesian species

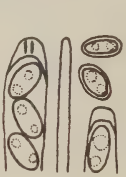
1. **Neobulgaria pura** (Pers.: Fr.) Petrak, Ann. Mycol. **19:** 44, 1921.

≡ *Peziza pura* Pers., Observ. Mycol. **1**: 40, 1796 : Fr., Syst. Mycol. 2: 168, 1822.
≡ *Bulgaria pura* (Pers.) Fr., Syst. Mycol. **2**: 168, 1822.
≡ *Ombrophila pura* (Pers. : Fr.) Fr., Summa veg. Scand. 357, 1849.
= ? *Peziza undata* W. G. Sm., Grevillea **1**: 136, 1873.
≡ *Aleuria undata* (W. G. Sm.) Boud., Hist. Class. Discomyc. Europ. 46, 1907.
≡ *Neobulgaria undata* (W. G. Sm.) Spooner & Y. J. Yao, Mycol. Res. **99:** 1517, 1995.
= *Coryne microspora* Ellis & Everh., Bull. Torrey Bot. Club **24:** 282, 1897.
≡ *Ombrophila microspora* (Ellis & Everh.) Sacc. & P. Syd., Syll. Fung. **14:** 802, 1899.
≡ *Ascocoryne microspora* (Ellis & Everh.) Korf, Phytologia **21:** 202, 1971.

RECENT TAXONOMIC TREATMENTS:
Roll-Hansen (1979), Spooner & Yao (1995).

PREVIOUS MACARONESIAN RECORDS:
None.

TYPE LOCALITY:
Germany, "Hercynia."



N. pura, apices of 2 asci and 1 paraphysis, 2 ascospores, all CUP-MM 1704. x 1000.

KNOWN MACARONESIAN DISTRIBUTION

AZORES.
Sao Miguel. CUP-MM 1704.
CANARY ISLANDS.
Tenerife. CUP-MM 252 (TFC) CUP-MM 621 (TFC).

SUBSTRATUM:
On rotted wood, on wood in stream bed, and on wet branch.

Notes: Our collections have both spore characters (spores ellipsoid, 6.2–6.9 x 3.1–3.8 µm) and excipular structures (inner ectal excipulum of elongated textura prismatica) identical with *N. pura* even though apothecia are much smaller (1.75 cm maximum diam when dry). We have studied the isotype (CUP-D 2005 [115-94]) and the paratype (CUP-D 8545 [115-95]) of *Coryne microspora* Ellis & Everh. and agree with Roll-Hansen (1979) who has synonymized that species with *N. pura.* The holotype (K[M]: 31760) of *Neobulgaria undata* (W. G. Sm.) Spooner & Y. J. Yao has similar or identical microscopic characters (spores and excipulum) and might well be conspecific with *Ascocoryne microspora* (= *N. pura*) as suggested by Spooner & Yao (1995). Probably the only difference is in the host plant (stems of a tree fern) and more cupulate, solitary and significantly smaller apothecia than in *N. pura* from Europe (NY: Fungi exsic. Suecici # 2100; BRA: Slovakia, J. Kuthan, 8.VII.1988), from North America (Korf Herb.: 58-25, 58-24, 53-230), and from Japan (Korf Herb.: JA 596, JA 1710, JA 1732, JA 1749).

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FRESHWATER ASCOMYCETES: MACROSPORA TYPHICOLA (PLEOSPORALES) REVISITED

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ABSTRACT

Macrospora typhicola (Cooke) Shoemaker & Babcock was collected from *Typha latifolia* L. submerged in lakes. Two collections from northern Wisconsin and one from Illinois were compared to the type specimen; a revised description and illustrations are provided. A gelatinous sheath was present on ascospores in all fresh collections but was not observed in the type material. The ascomatal lid characteristic of *Macrospora* was not observed in the type or fresh material.

Key words: Diademaceae, limnetic, Loculoascomycetes.

INTRODUCTION

As part of an on-going study of freshwater ascomycetes in northern Wisconsin, monthly collections were made of submerged macrophyte stems from Allequash Lake and Big Muskellunge Lake. Mature ascomata found on stems of *Typha latifolia* L. were identified as those of *Macrospora typhicola* (Cooke) Shoemaker & Babcock [Diademaceae *sensu* Shoemaker & Babcock, 1992]. The foregoing collections and another from Cherry Hills Lake in Champaign County, Illinois, were compared to the type specimen of *M. typhicola*. Details of morphology and anatomy are described and illustrated of both fresh collections and the type specimen of *M. typhicola*.

MATERIAL AND METHODS

Submerged stems of *T. latifolia* L. were collected from the habitat and placed in moist chambers (plastic storage boxes lined with moistened paper towels) at ambient temperatures (23-25° C) for 4 wk to stimulate ascomatal development. Samples were examined weekly with the dissecting microscope to locate ascomata. To illustrate anatomical details and centrum structure, ascomata were removed and fixed in 4% glutaraldehyde, embedded in ultra-low viscosity resin (Huhndorf, 1991), and sectioned at 6 µm. Thin sections were mounted on gelatin coated microscope slides and permanently preserved using a 1:1 mixture of Permount and Xylene. Ascomata from the type specimen were boiled in water for two minutes and fixed and sectioned using the above procedures. Ascomata were crushed in a drop of water or 5% KOH on glass slides for examination of the ascomatal wall in surface view, pseudoparaphyses, asci, and ascospores. India ink was added to squash mounts to detect the presence of a gelatinous sheath around the ascospores and gelatinous coating on asci and pseudoparaphyses. Lactic acid with Azure A was used to preserve squash mounts. For demonstration of a lid-like ascomatal opening, the techniques of Shoemaker and Babcock (1992) were used.

TAXONOMY

Macrospora typhicola (Cooke) Shoemaker & Babcock, Canad. J. Bot., 70: 1644. 1992.

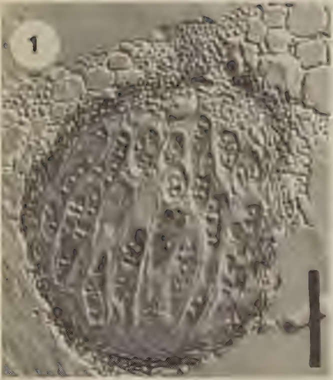
≡ *Sphaeria typhicola* Cooke, Grevillea 5: 121.(as '*typhaecola*') 1877.

≡ *Pleospora typhicola* (Cooke) Sacc., Rev. Mycol. (Toulouse) 3(11): 46. 1881.

≡ *Clathrospora typhicola* (Cooke) Höhn., Ber. Dtsch. Bot. Ges. 35: 252. 1917; Ann. Myc. 16: 89. 1918.

≡ *Pyrenophora typhicola* (Cooke) E. Müller, Sydowia 5: 256. 1951.

Figs. 1–6. *Macrospora typhicola* from the holotype. 1. Median section of ascoma embedded in ultra-low viscosity resin, bar = 100µm. 2. Longitudinal section through ascomal wall. 3. Surface view of tomentose ascoma, bars for Figs 2, 3 = 50 µm. 4. Cellular pseudoparaphyses, bar = 25 µm. 5. Ascus with ocular chamber, bar = 50 µm. 6. Asci, bar = 100 µm.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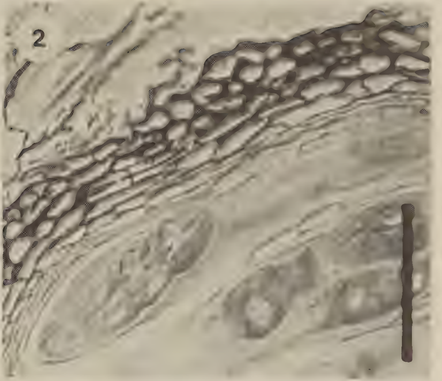
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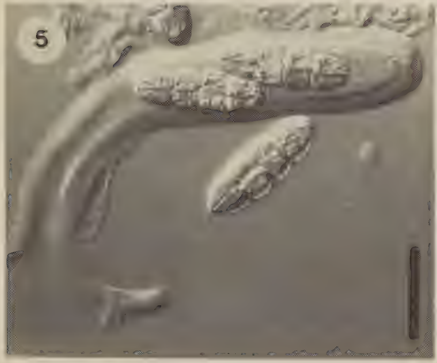
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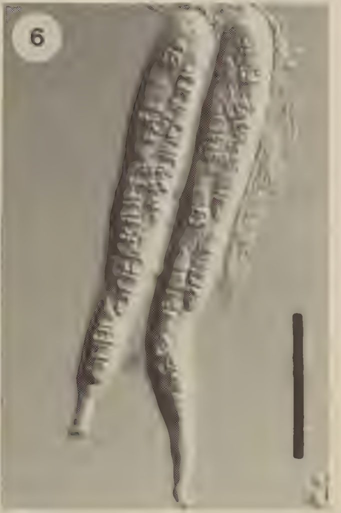
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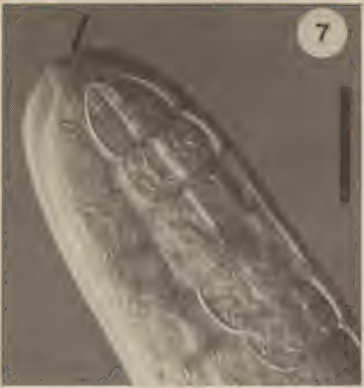
Ascomata scattered, immersed, becoming erumpent, globose, often depressed-globose, papillate, appearing as small black dots on the surface, densely tomentose, tomentum of light-brown hyphae, 366–380 × 331–345 µm (Figs 1, 3, 13). **Lid** on papilla not seen. **Ascomatal wall** membranous, small-celled, of *textura angularis* in surface view and in longitudinal section (Figs 2, 14), inner region 12–15 µm wide, composed of two to three cell layers of hyaline, compressed, fusoid cells, 10–16 × 2–6 µm; outer region of five to six cell layers, 25 µm wide, of dark brown, compressed, pseudoparenchymatic cells, 4–10 × 2–6 µm. **Pseudoparaphyses** cellular, numerous, slightly constricted at septa, narrow, 4–6 µm in width (Fig. 4), extending up to the apex. **Asci** numerous, fissitunicate, 222–253 × 43(-47) µm with eight biseriate ascospores, clavate to broadly clavate, tapering at the base to a short stalk (Fig. 6); ascus wall thickened at the apex (Figs 15, 17), endotunica with ocular chamber, chamber thickened and with nasse, not reaching to the ectotunica, with three to four striae extending downward from the apex and parallel to the long axis of the ascus toward the base; ascus base claw-like. **Ascospores** initially hyaline, becoming light brown, fusoid to oblong-ellipsoid, one cell wide in side view, two cells wide in face view, (47-)58.5–66 (-70) × 15.5–23.5 µm, with three transverse septa and a single longitudinal septum in each cell layer (Figs 5, 11), constricted at septa, symmetric, ends broadly rounded or acutely tapered or with one end broadly rounded and the other acutely tapered; longitudinal septa seen in face view only; they may be central and all in the same line or off-center and in different places in each cell layer; longitudinal septa perpendicular or at a slight angle from the perpendicular to transverse septa; spores surrounded by a gelatinous sheath, 7.8–11.7 µm wide (Figs 12, 16, 18).

***Collections examined*:** ENGLAND, North Ructon, as *Macrospora scirpi*, on *Typha latifolia* L., Jan. 1873 (Plowr. Sph. brit. II, 74) (Holotype, K). USA. ILLINOIS: Champaign Co., Cherry Hills Lake, UTM zone 16, 389840mE, 4437475mN, on *Typha latifolia* L., 11 Mar. 1995, *C.A. Shearer, A-193-1* (ILLS 53105). WISCONSIN: Vilas Co., Allequash lake, UTM Zone 16, 389840mE, 4437475mN, on *Typha latifolia* L., 16 May 1995, *P.M. Fallah, P4-9* (ILLS 53106);

Figs. 7–12. *Macrospora typhicola* from the holotype. 7–8. Ascus with nasse apicale. 9. Striae in broken basal portion of ascus. 10. Immature ascus with striae. 11. Ascospores in face view with longitudinal septa and side view, bar = 50 µm. 12. Ascospore in side view. bars for Figs 7-10 and 12 = 25 µm.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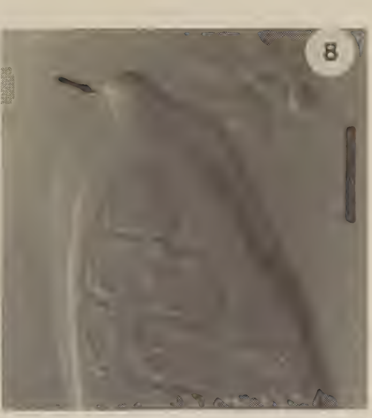
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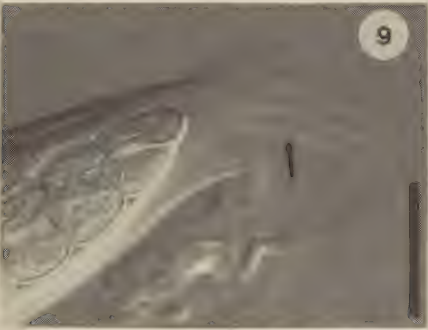
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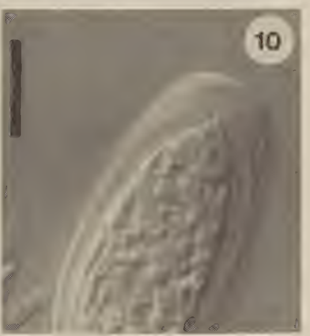
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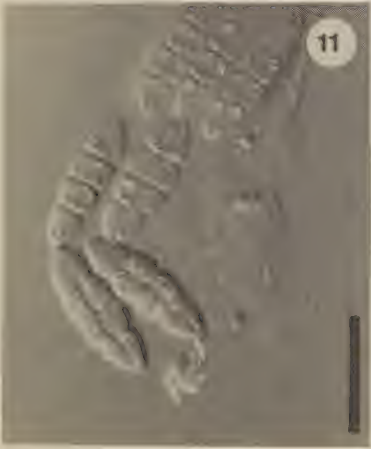
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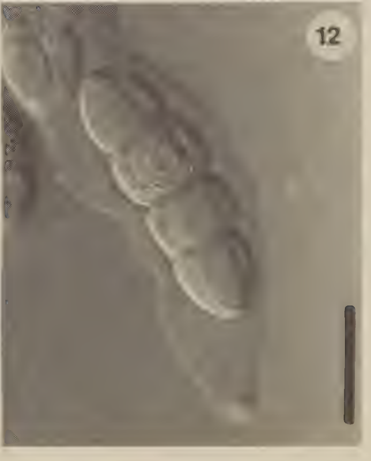
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Vilas Co., Big Muskellunge Lake, UTM Zone 16, 297663mE, 5097935mN, on *Typha latifolia* L., 28 Oct. 1995, *P.M. Fallah* and *J.L. Crane, P3-36* (ILLS 53107).

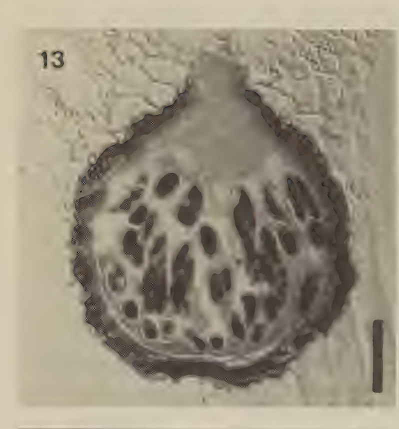
***Habitat*:** On submerged dead culms of *Typha* spp.

***Known distribution*:** Austria, England, Germany, Switzerland, USA (Illinois, Wisconsin, and Minnesota).

DISCUSSION

Macrospora typhicola was originally described by Cooke (1877) as *Sphaeria typhaecola*. Saccardo (1883) transferred this fungus to *Pleospora* and von Höhnel (1917) placed it in *Clathrospora*. Later it was transferred to *Pyrenophora* by Müller (1951). Shoemaker and Babcock (1992) established a new family, Diademaceae, for fungi possessing an intraepidermal lid covering a circular ascomal opening. They transferred *Pyrenophora typhicola* (Cooke) E. Müller to the genus *Macrospora* based on the presence of a lid which was 40-70 µm wide, and when viewed from the surface, composed of pale brown, polygonal cells of 5-7 µm diam. (Shoemaker & Babcock 1992). We were unsuccessful in demonstrating the lid on the fresh specimens. This was due to scarcity of ascomata on fresh samples. Only one ascoma was used for examination of the lid. Ascomata of the holotype were not examined with the techniques used by Shoemaker and Babcock (1992), instead a vertical section was made through ascomata. Detecting the presence of a lid may depend in part on having the appropriate ascomal developmental stage. Developmental studies of this fungus would be very useful in determining the conditions under which the lid occurs. Cultures derived from single ascospores did not yield fruiting bodies and remained sterile. Colonies on corn meal agar were composed of branched, dark brown, and partially immersed mycelia.

Figs. 13–18. *Macrospora typhicola* from P3-36 (Wisconsin) and A-193-1 (Illinois) collections: 13. P3-36, longitudinal section through ascoma, bar = 100 µm; 14–16, (A-193-1). 14. Longitudinal section through ascomatal wall, bar = 25 µm. 15. Ascus after dehiscence, bar = 100 µm. 16. Ascospores after discharge in water showing gelatinous sheath, bar = 100 µm. 17–18, (P3-36). 17. Discharged ascus with thickened wall and mature ascospores, bar = 100 µm. 18. Ascospore with gelatinous sheath in side view, bar = 25 µm.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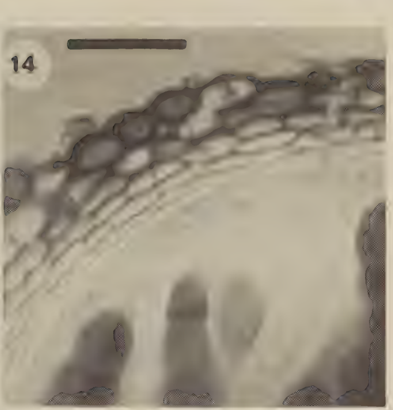
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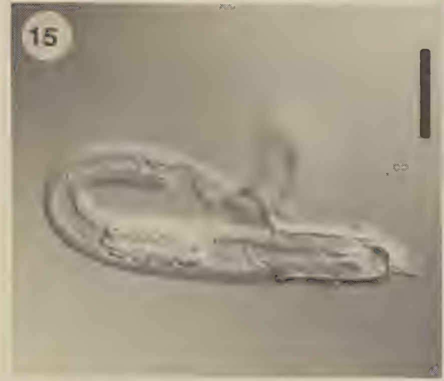
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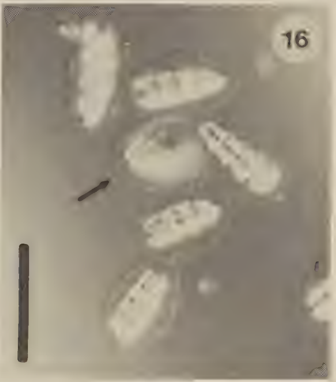
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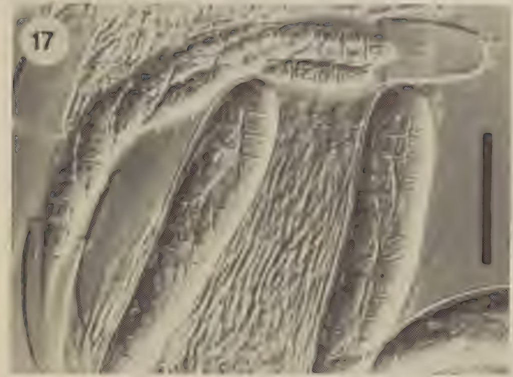
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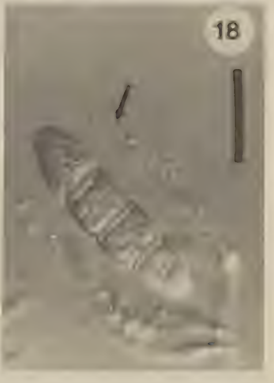
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Our examination of fresh specimens revealed a gelatinous sheath surrounding the entire ascospore (Figs 16, 18). We did not observe a sheath around the ascospores of the holotype. The presence of a gelatinous sheath around the ascospores has not been recorded previously for *M. typhicola* and was not observed in the type specimen. The ascospore sheath in many species cannot be observed in dried herbarium specimens or when preserved in lactic acid or lactophenol, which may account for the discrepancy between the type specimen and fresh collections (Funk & Shoemaker 1967).

Measurements of ascomata, asci, and ascospores were, in general, slightly greater for the type specimen than the fresh material examined. The measurements of asci for the A-193-1 collection were slightly greater than either of those of the Wisconsin collections, P4-9 and P3-36. Only one ascoma was found among the P4-9 collection from Allequash lake, and therefore, identification of this isolate was based primarily on asci and ascospores.

Ascomata of fresh collections were embedded in a dense tomentum of light brown hyphae similar to that found on ascomata of the type specimen. When ascomata of the type specimen were crushed in both water and 5% KOH, an ascus ocular chamber with nasse apicale (Chaudefaud, 1954) was observed. The use of 5% KOH provides a sharper image of the nasse apicale than mounting in water (Funk & Shoemaker, 1967) (Figs 7, 8). Funk and Shoemaker (1967) reported asci with layered structures in *Botryosphaeria piceae* Funk, *Botryosphaeria quercuum* (Schw.) Sacc., and *Pleospora herbarum* (Pers. :Fr.) Rabenh. var. *herbarum*. Reynolds (1971) discussed the structure of the bitunicate ascus wall and illustrated two to four twistings, longitudinal bands or striae which converge in the apical portion of the ascus. Three to four bands were observed in asci of the type specimen of *M. typhicola* and were present before (Fig. 10) and after the formation of the nasse apicale (Figs 7-9). These bands are especially visible when the basal portion of the ascus is broken off, a characteristic that was also observed by Eriksson (1981) (Fig. 9). Among the fresh specimens examined, an ocular chamber occurred but no nasse apicale was observed. Pseudoparaphyses were abundant in ascomata of all collections. Ascospores of most fresh specimens possessed a gelatinous sheath (Figs 16, 18). However, gelatinous coatings on asci and pseudoparaphyses were not observed in any of the specimens examined. Although ascospores of the type specimen occasionally lacked a longitudinal septum perpendicular to the transverse septum in the end cells, ascospores of fresh collections always possessed such a septum in the end cells. Wehmeyer (1961) and Shoemaker and Babcock (1992) noted that some ascospores in the type specimen had three transverse septa with a vertical septum bisecting some spores and that the spores were immature. We found mature ascospores with longitudinal septa in all four cell layers in both the type material as well as in fresh specimens.

Macrospora typhicola is associated with two *Typha* species, *T. latifolia* L. *and T. angustifolia* L. Our collections and one reported by Cavaliere (1975) were made from submerged culms of *Typha* spp. in lakes. The collections from Illinois and Wisconsin were made during the months of March (Illinois isolate, A-193-1) and October (Wisconsin isolate, P3-36) when the water temperature is relatively cold (i.e., 10.5° C). Only one well-preserved ascoma (P4-9) was recovered from decomposed stems of *T. latifolia* collected during the month of May when the average water temperature was 10.6° C (LTER, 1995). This fungus was not found in subsequent monthly collections from October 1995 to August 1997.

ACKNOWLEDGMENTS

We are grateful to Professors Walter Gams and J. L. Crane for reviewing the manuscript prior to submission. Thanks are expressed to North Temperate Lakes LTER projects, Center for Limnology, University of Wisconsin for providing the water temperature data and permission to collect from LTER lakes. We also thank KEW herbarium for the loan of the holotype of *M. typhicola*. Financial support of this study by the National Science Foundation (NSF Grant No. DEB 92-00885) is gratefully acknowledged.

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NEW SYNONYMY IN HYPHODERMA RUDE (CORTICIACEAE)

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SUMMARY

Based on the study of the type specimens and literature, two new synonyms are proposed in *Hyphoderma rude* (Bres.) Hjortst. & Ryv.. This work also presents a description, comments and illustrations of this species.

RESUMO

Baseado no estudo das espécies tipo e na literatura, são propostos dois novos sinônimos em *Hyphoderma rude* (Bres.) Hjortst. & Ryv.. Este trabalho igualmente apresenta descrição, comentários e ilustrações desta espécie.

While studying specimens of *Hyphoderma rude* (Bres.) Hjortst. & Ryv. we found there were two other species closely related to it, i. e., *Hyphoderma odontiaeforme* Boid. & Berthet and *Hyphoderma crystallophorum* Gilb. & Adask.. So, we borrowed the type specimens to compare them one with the other and with our material to resolve this taxonomic problem.

Hyphoderma rude (Bres.) Hjortst. & Ryv.

Mycotaxon Vol. X, n^{o} 2, p 275, 1980.
Basionym: *Odontia rudis* Bres., Ann. Mycol. Vol.:18: 42, 1920
Nomenclatural type: Brasil, S. Leopoldo. Rick 51. (S !).
- *Hyphoderma odontiaeforme* Boid.& Berthet ap. Berthet & Boid.,Cah. Maboké 4: 43, fig.7, 1966.
- *Odontia mucronata* Furukawa, Bull.Gov. Exp. St. Tokyo 261: 42, fig. 34-35, 1974.
- *Hyphoderma mucronatum* (Furuk.) Wu, Acta Bot. Fenn. 142: 75, fig. 47-48, 1990.
- *Hyphoderma crystallophorum* Gilb. & Adask. Mycotaxon 49: 374, fig. 4, 1993. Holotypus: RLG 16791 (BPI !)
- *Irpex arborescens* Rick, Iheringia Bot. 5: 191, 1959. Holotypus: FR 16591 (PACA !)

Fruitbody resupinate, rather adnate, thin when young, thickening with age. In color white (018) to cream (017 to 19 - 6º) (VILLALOBOS-DOMINGUES & VILLALOBOS,

1947) turning orange colored with age. **Hymenophore** odontioid, with crowded and densely distributed teeth, with frimbriate apices .; margin smooth and thinned, slightly differentiated.

Hyphal system monomitic with thin-walled to rather thickened hyphae, with clamps at all septa, 2.0 - 4.5 µm in diam. Subicular hyphae thick-walled (fig. 1. b), with horizontal arrangement and closely spaced. In the weave, hyphae thin-walled, rather branched and loosely interwoven. Subhymenial hyphae with vertical arrangement and closely spaced. Crystals abundant all over the mycelium appear in larger concentrations on the teeth; in some specimens, they are restricted to the teeth. **Cystidia** of two types: 1) Gloeocystidia (fig. 1 c) with thin to slightly thickened walls, swollen in the base, tapering toward the apex, (18.35) 21.5 -64 x (6.5)9-11 µm in size. A small refractive mucron, about 2.5 µm long, which is rapidly dissolved in KOH solution, can be observed on the apex. These cystidia are either imbedded or protruding in the hymenium; 2) Stephanocists (fig. 1 d) which are not easily seen can be oberved in the hymenium, globular, with a toothed fringe in the middle, with a clamp at the base. **Basidia** (fig. 1 e) cylindric to slightly clavate, thin-walled, clamped at the base, with four sterigmata, 14-22 x 5.0-7.0 µm. **Spores** (fig. 1 f) ellipsoid to subcylindric, thin-walled, non cyanophilous, non amyloid, in various sizes, 6-11.5 x 3-6 µm.

Habitat: over indeterminate angiosperms.

Geographical distribution: reported from Africa, France, Hawai (USA), Taiwan and Brazil.

Material examined: **BRASIL**, Rio Grande do Sul, **GUAÍBA**, Sítio Matzembacker, leg. S.A.Nietiedt & R.T. Guerrero 065, 03/VIII/1990 (ICN 97885); **VIAMÃO**, Parque Saint-Hilaire, leg. S.A.Nietiedt 120, 4/X/1991 (ICN 97886); **PORTO ALEGRE**, Parque Farroupilha, leg. R.T.Guerrero, III/1992 (ICN 97887); leg. S.A.Nietiedt & R.T.Guerrero 157, 23/VI/1992 (ICN 97888); **BOM JESUS**, leg S.A.Nietiedt & R.T.Guerrero 166, 28/XII/1992 (ICN 97889); **BARRA DO RIBEIRO**, Horto florestal Barba Negra, leg. S. A. Nietiedt 54, 25/VII/1990 (ICN 97890).

Type material examined: BRASIL, Rio Grande do Sul, **SÃO LEOPOLDO**, leg. Rick 51 (S !) holotype of *O. rudis*; **UNITED STATES**, Hana Highway, **Maui**, Mile 6, RLG 16791 (BPI !) holotype of *H. crystallophorum*; **BRASIL**, Rio Grande do Sul, **SÃO LEOPOLDO**, FR 16591 (PACA !) holotype of *I. arborescens*.

Remarks: This species is easily determinated by its odontioid hymenophore and by the presence of mucronate gloeocystida and stephanocysts. HJORTSTAM & RYVARDEN (1980) describe this taxon as having gloeocystidia with rounded apex and suggest a synonymy of *H. odontiaeforme* Boid. & Berthet, notwithstanding admitting that they have not studied the type of the latter. BOIDIN & GILLES (1991) remark that the species are at least very similar but they do not suggest a synoymy since Hjortstam did not observed any mucronate gloeocystidia in *H. rude* and, besides, he did not analyze the type of this particular species. In studying the type material of *H. rude* (= *Odontia rudis* Bres.), we noticed the presence of mucronate gloeocystidia, thus, we consider *Hyphoderma odontiaeforme* Boid. & Berthet to be a synonym of *Hyphoderma rude* (Bres.) Hjortst. & Ryv., as suggested by Hjortstam & Ryvarden. All specimens here studied are identical to Rick's type material, and have been collected from areas close to RIck's collecting location. RAJCHEMBERG (1987) considers *Irpex arborescens* Rick as a synonym of *H. rude*. In studying the type species of *I. arborescens*, we have observed the presence of mucronate gloeocystida and stephanocysts, therefore, we agree with Rachemberg, that *I. arborescen* is synonimous with *H. rude*. GILBERTSON & ADASKAVEG (1993) have recently described, for the United States, a new species named *Hyphoderma crystallophorum* Gilb. & Adask. , which shows the same structural characters: presence of mucronate gloeocystia,

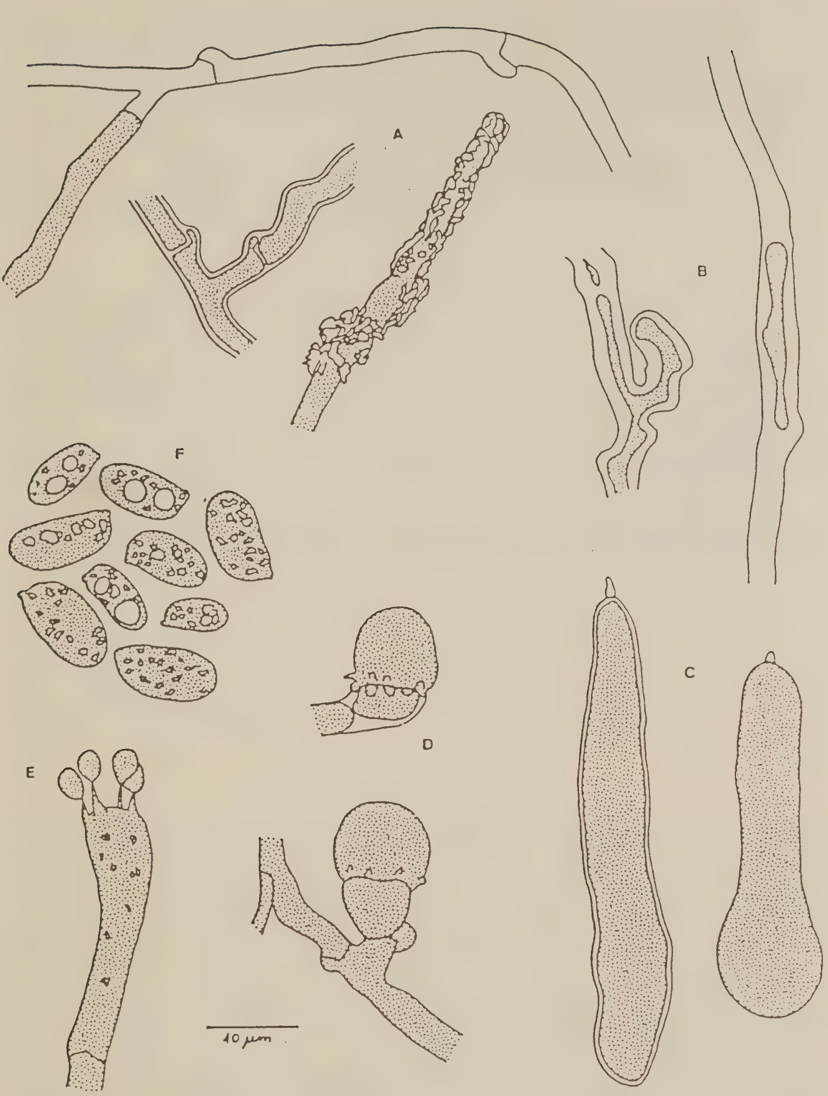

Fig. 1. a) generative hyphae, b) subicular hyphae, c) mucronate gloeocystidia, d)stephanocysts, e) basidia, f) spores.

stephanocysts, same size of spores, basidia (20-24 um) slightly larger than in *H. rude* and, according to the authors, differing from the latter only by the presence of teeth with crystal incrustations. However, it is worth stressing that the species *Hyphoderma odontiaeforme* is described by Boidin as exhibiting crystals on the teeth, our material has also presented this character, moreover, in studying the type species of *Hyphoderma rude*, we also have observed the presence of crystals, although this presence had not been reported by Hjortstam & Ryvarden when they described the species.

In conclusion, after studying the holotype of *Hyphoderma crystallophorum* Gilb. & Adask., we point out that this species shows the same characters as does *Hyphoderma rude* (Bres.) Hjortst. & Ryv. being, therefore, another synonym of the latter.

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MYCOTAXON

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ASCOMYCETES DESCRIBED FROM NEW CALEDONIA, SOUTH PACIFIC REGION

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ABSTRACT - Interest in fungi of the South Pacific region dates back almost two centuries. This paper deals with ascomycetous taxa having protologues based on material collected mostly in New Caledonia and French Polynesia. Over one hundred taxa have been described from these islands. Available information suggests that the majority have not been the subject of further interest since their original publication. Only ten synonymies and ten generic changes have been detected.

For each taxon, information about type material and present location are provided, with a concise comment concerning taxonomic status. 65 genera are treated with most being represented by only one species. Six genera were proposed following study of material originating from the South Pacific region: *Hugueninia, Lembosia, Isia, Seuratia, Squamotubera* and *Vizellopsis*. This contribution to the knowledge of the biodiversity of fungi of the South Pacific aims to promote taxonomic work on ascomycetes of these tropical lands.

KEY WORDS : fungi, ascomycetes, taxonomy, South Pacific, New Caledonia, French Polynesia, list, taxa described from, taxonomic status.

INTRODUCTION

The island of New Caledonia was discovered and named by Captain Cook during his second trip in the Pacific in 1774. Twenty years later, L. A. Deschamps and J. La Billardière collected a second set of botanical specimens in this island, in almost the same localities visited earlier by naturalists accompanying Cook. Examination of material deposited by La Billardière in Paris, allowed J. H. Léveillé fifty years later to describe *Depazea celastrina* (Léveillé, 1845).

Serious investigations of the New Caledonian flora began one hundred years after the discovery of this island. Primary intensive collections started in 1855 and lasted for twenty years. This field work was principally undertaken by two naval surgeons E. Vieillard and E. Déplanche and two official collectors sent by the Muséum d'Histoire Naturelle de Paris: I. Pancher and B. Balansa. Beside plant material, some fungi were also collected. These were either deposited in the Paris Herbarium of the Muséum d'Histoire Naturelle or were later on made available to mycologists of this institution. McKee (1966) published an excellent historical account of early botanical studies made in New Caledonia.

The first significant contributions on New Caledonian fungi were by N. Patouillard in two papers that appeared in 1887. These were based on material already present in the Paris Museum including several novel ascomycetes. These were followed by a series of publications until the advent of the first world war. Most of these writings were by Patouillard alone but a few were also achieved in collaboration with P. Hariot. The scope of these notes was not limited to fungi of New Caledonia, but extended to specimens collected from French Polynesia and to a lesser extent from Samoa (Bresadola & Patouillard, 1901).

Following primary collecting efforts made by Vieillard and his contemporaries until 1872, other naturalists maintained the flow of fungal specimens sent to Europe up to 1914. The most notable resident French collectors were J. Bernier and two school teachers, namely A. J. Le Rat (and his wife Louise) and I. Franc. In 1902, a collection of 84 species was sent to Paris by Bernier. Between 1900 and 1911 several interesting taxa were collected, principally by Le Rat. Among visitors to New Caledonia, K. Sarasin and J. Roux made a large and fairly representative collection of fungi in 1911-12, including many ascomycetes; this material was made available to mycologists at Kew. They were followed two years later in this main island by Prof. R. H. Compton.

For New Caledonia, the advent of steamships drastically reduced the frequency of units anchoring in Nouméa for supply renewals and this severely affected the island economy. Interest in New Caledonian flora (and fungi) then slackened seriously. The situation remained as such up to Wold War II, which highlighted the strategic importance of this island in the South Pacific region.

In 1949, the establishment of the ‘Institut Français d’Océanie (IFO)’ at Nouméa (now Centre ORSTOM de Nouméa) marked a surge of local scientific studies conducted by resident phytopathologists. This was rapidly exemplified by the publication of a list of fungi parasitic on cultivated plants in New Caledonia (Bugnicourt & Marty, 1961). Soon after, B. Huguenin intensively collected fungi in this area. These were described between 1964 to 1969 in his series ‘Micromycètes du Pacifique Sud’. Huguenin also made pure culture studies and taxa (including ascomycetes) he observed are reported in his *Microfungi of New Caledonia* (Huguenin, 1967). However, interest in this group of microorganisms was restricted to taxa involved in local phytopathological problems (Kohler & Pellegrin, 1992).

The current project ‘Land Biodiversity in New Caledonia’ of the Muséum National d’Histoire Naturelle, emphasized the study of fungi inhabiting this island (Mouchacca & Zucconi, 1993). A survey underlined the necessity to bring together information on novel taxa based on material originating from this area. Scanning of published documents suggested the extension of the area under consideration to French Polynesia.

The present contribution will only deal with meiosporic non-lichenized ascomycetous taxa. Basidiomycetes and mitosporic fungi shall be treated in subsequent publications.

INFORMATION ABOUT NOTABLE COLLECTORS

BALANSA Benjamin (1825-1891): This famous traveller and important worldwide plant collector lived in New Caledonia and the Loyalty Islands from 1868 to 1872. He collected on behalf of the Muséum d’Histoire Naturelle de Paris.

BERNIER Julien (1848-1903): Born on the island La Réunion on January 14, 1848. Worked as a reporter in New Caledonia where he was elected in 1885 as General Councillor. In 1894, he was appointed Director of the Muséum de Nouméa du Ministère des Colonies, a position he held until his death. This aroused his interest in the local flora, an activity he shared with an ex convict Léon CRIBS. Starting from 1898, more than 2000 botanical specimens were sent by both collectors to the Paris Museum. Bernier died at Nouméa on March 3, 1903.

COMPTON Robert Harold (1886-1979): English botanist who worked in South Africa. He was appointed Director of the Kirstenbosch Botanical Garden in Cape Town from 1919. He also taught Botany at the University of Cape Town. Collected in New Caledonia during a trip made in 1914.

FILHOL Henri (1843-1903): Former Professor of the Laboratoire d'Anatomie Comparée du Muséum d'Histoire Naturelle de Paris. He was a member of the French expedition sent to observe the transit of Venus in the South Pacific (1874 -1875). Filhol collected much in Campbell's Island and in New Zealand.

FRANC Isidore (1861-1930): A school teacher at Nouméa. Collected intensively between 1905 to 1930, principally in the central southern woody mountains of the main island and especially at Mount Dzumac.

HUGUENIN Bernard: A phytopathologist who worked at the ORSTOM Center of Nouméa from 1962-1968.

LA BILLARDIERE Jacques Julien Houttou (1755-1834): Naturalist on the expedition during 1791-1796 of the French ships 'La Recherche' and 'L'Espérance' sent to search for La Pérouse who was lost in the Pacific in 1788. Collected in Balade, New Caledonia, during three weeks in April 1794.

LEPINE Jules (1817-1884): A naval pharmacist who collected fungi, lichens and bryophytes from Tahiti in 1847. These were described by Montagne.

Le RAT Auguste Joseph (1872-1910): A school teacher at Nouméa who died at a young age. He made extensive botanical trips between 1900 to 1910, often accompanied by his wife Louise. She also often collected alone when her husband was occupied by his teaching commitments and after his death too.

MARTY Jean: A phytopathologist active at the ORSTOM Center at Nouméa from 1959-1964.

NOTHIS Alfred: A pharmacist who mainly studied medicinal plants at the ORSTOM Nouméa Centre from 1965-1968.

PANCHER Isadore (?- 1877): Apparently the sole official botanist in New Caledonia where he was sent by the Muséum d'Histoire Naturelle de Paris. He arrived from Tahiti in 1857 and remained there up to 1869. Pancher returned to New Caledonia in 1874 with the financial assistance of the great belgian holticulturist LINDEN and pursued his activity in the island until his death in 1877 (McKee & McKee, 1981).

SEURAT Léon Gaston (1872-?): Obtained his doctorate degree in Natural Sciences in Paris in 1899 and was then appointed as a zoologist at the newly established Laboratoire de Biologie Appliquée aux Colonies de l'Ecole des Hautes Etudes. As such, he was sent by the Ministry of Colonies on an exploratory mission to the South Pacific Islands of Tahiti, Tuamotu and Gambier (1902-1905). He also collected various kinds of plants and some fungi.

SARASIN Karl Friedrich 'Fritz' (1859-1942): Famous wealthy zoologist explorer from Basel, Switzerland. Together with another swiss amateur, Jean ROUX (1876-1939), he made a botanical excursion to New Caledonia and the Loyalty Islands in 1911-12. Their large collection of fungi was made available to mycologists of the Royal Botanic Gardens at Kew (K).

SCHMID Maurice: A botanist at the Nouméa ORSTOM Center from 1964-1975.

VIEILLARD Eugène (1819-1896): Surgeon with the French merchant navy. Collected in New Caledonia first from 1855 to 1860. After a two year break in France, he returned to this island until his departure in 1867. Collections from New Caledonia made by Vieillard were undertaken practically in the same period in collaboration with another marine surgeon, Emile DEPLANCHE (1824-1875).

VEILLON Jean-Marie: A botanist of the Services des Eaux et Forêts de Nouvelle-Calédonie from 1964. Starting from 1970, he joined the Laboratoire de Botanique, Centre ORSTOM de Nouméa.

LIST OF RECORDED TAXA

Material studied by Patouillard is now housed in the Farlow Herbarium. Pfister (1977) published an annotated index to fungi described by this author. Such included the number of the herbarium sheet on which a specimen is located. The New Caledonian Herbarium was recently transferred from Nouméa to Paris and this move enabled retrieval of further authentic material described from this island (Mouchacca, 1990).

References were abbreviated according to B-P-H/S (Botanico-Periodicum-Huntianum/Supplementum Hunt Institute for Botanical Documentation, Pittsburgh, 1991). The following abbreviations are used: H: Holotype; NC: New Caledonia; FP: French Polynesia; SP (or PS): South Pacific.

⇒ ***Aleurina tahitensis*** (Pat.) Sacc. & Syd. - Syll. Fung. 16: 740. 1902. H: **FH** No. 5056.

≡ *Phaeopezia tahitensis* Pat. - Bull. Soc. Mycol. France 12: 135. 1896. On fallen wood, Island of Tahiti, leg. and date of collection not specified in the description.

No part of the original collection is now available at PC either under the epithets *Aleurina* or *Phaeopezia*. In FH, the original specimen is simply annotated ‘Herbier Pancher’ but accompanied by a detailed drawing made by Patouillard (Pfister, pers. comm.). P*haeopezia* figures not in the last edition of the Dictionary of the Fungi (Hawksworth *et al.*, 1995). *Aleurina* Massee has been recently monographed by Zhuang & Korf (1986). Based on the original description, *Aleurina tahitensis* was excluded because ‘the apothecium has long, dark hairs, and the ascospores are pale brown’. Its taxonomic position thus awaits reconsideration.

⇒ ***Amazonia geniostomatis*** Huguenin - Rev. Mycol. (Paris) 34: 46. 1969. H: **PC** (NC 66-107). On leaves of *Geniostoma oleifolium* S. Moore, Montagne des Sources, close to the City of Nouméa, 5 X 1966, NC, leg. B. Huguenin.

Amazonia Theissen is a later homonym of a plant genus, and a general account is still unavailable (Hawksworth *et al.*, 1995).

⇒ ***Amazonia novae-caledoniae*** Hansford - Kew Bull. 1957: 410. 1958. H: **K** (McKee 5174 *p.p.*). On leaves of *Schefflerae vieillardii (*Araliaceae*)*, NC (only details reported).

The fungus was apparently discovered by Hansford in Kew while examining material for his revision of the *Meliolinae* (Hansford, 1961). The species was however later overlooked by Huguenin (1969).

⇒ ***Amazonia pancheriae*** Huguenin - Rev. Mycol. (Paris) 34: 30. 1969. H: **PC** (NC 66-158). On leaves of *Pancheria* sp., Mont Panié, 10 IX 1966, NC, leg. M. Schmid.

⇒ **Anthostomella pacifica** Udagawa, Uchiyama & Kamiya - Mycoscience 35: 319. 1994. H: **BF** 44319 (**CBM**). The authentic living strain was isolated from a sample of forest soil collected near the village of Tao, Northern Province of NC.

⇒ **Ascotricha novae-caledoniae** Udagawa, Uchiyama & Kamiya - Mycotaxon 52: 215. 1994. H: **CBM**, Japan. The selected living strain was isolated from forest soil collected at Pic d'Amoa near Tieti, Poindimié, Northern Province of NC, 17 VI 1993.

This recently described soil-borne fungus is characterized by non-ostiolate ascomata and the absence of an anamorph. Typical *Ascotricha* Berk. species are ostiolate and produce a characteristic conidial state in culture. However, the presence of discoïd ascospores and the particular ascomatal hair ornamentation favoured its placement in *Ascotricha*. The fungus is the second species of this genus not producing ostiolate ascomata (Udagawa *et al*., 1994).

⇒ ***Asteridiella melaleucae*** Huguenin - Rev. Mycol. (Paris) 34: 28. 1969. H: **PC** (NC 66-168). On leaves of *Melaleuca gnidioides* Brongn. & Gris (Myrtaceae), Plaine des Lacs, 27 X 1966, NC, leg. B. Huguenin.

⇒ ***Asteridiella schmidii*** Huguenin - Rev. Mycol. (Paris) 34: 58. 1969. H: **PC** (NC 66-162). On leaves of *Austrotaxus spicata* Compton (Taxaceae), Mont Panié, 19 VI 1966, NC, leg. M. Schmid.

⇒ ***Berkelella caledonica*** (Pat.) Sacc.- Syll. Fung. 9: 989. 1891. H: **FH** No. 6731.
≡ *Hypomyces caledonicus* Pat. [as '*Hypomices*'] - Bull. Soc. Mycol. France 3: 126. 1887. Developing on the hymenium of basidiocarps of *Stereum fasciatum* Schwein., NC, leg. and date of collection not specified.

No part of the authentic material now exists in PC.

⇒ ***Biscogniauxia pithodes*** (Berk. & Broome) Whalley & Laessoe - Mycol. Res. 94: 239. 1994
= *Nummularia fusco-disca* Pat. - Bull. Trimestr. Soc. Mycol. France 31: 35. 1915. H: **FH** No. 6931. For additional synonyms, see Miller (1961).

The authentic material of *Nummularia fusco-disca* developed in the cortex of *Ficus indica* L. (Moraceae), Magenta, Nouméa, NC, leg. A. J. Le Rat. Miller (1961) gives the following annotations for the specimen he examined from FH: *Hypoxylon fusco-discum* Pat., M. Le Rat, New Caledonia, Farl. herb. TYPE (113).

Whalley *et al.* (1994) established the new section *Appendiculata* to segregate applanate species of *Hypoxylon* Bull. possessing features of *Biscogniauxia* O. Kuntze. This proposal is in agreement with Pouzar (1979) who combined the majority of dark-spored applanate species of the former in *Biscogniauxia* together with species of *Nummularia* Tul. *sensu* Miller (1961).

⇒ ***Caliciopsis myrticola*** Huguenin - Cah. Pacifique 13: 304. 1969. H: **PC** (NC 67-083). Obseved on living leaves of *Myrtus emarginata* Pancher ex Brongn. & Gris (Myrtaceae), Faux Bon Secours, 1 VI 1967, NC; leg. B. Huguenin.

⇒ ***Caliciopsis podocarpi*** Huguenin - Cah. Pacifique 13: 30. 1969. H: **PC** (NC 66-058). On living leaves of *Decussocarpus minor* (Carr.) de Laub [= *Podocarpus minor* (Carr.) Parl] (Podocarpaceae), Plaine des Lacs, 18 VII 1966, NC, leg. B. Huguenin.
⇒ ***Caliciopsis rapaneae*** Huguenin - Cah. Pacifique 13: 305. 1969. H: **PC** (NC 67-032). On twigs of *Rapanea lanceolata* Mez. (Myrsinaceae), Mont Mou (1200 m), 27 XII 1967, NC, leg. J.-M. Veillon.
⇒ ***Caliciopsis veillonii*** Huguenin - Cah. Pacifique 13: 302. 1969. H: **PC** (NC 67-050). On dead twigs of an unknown plant, (locality ?), 27 IV 1967, NC, leg. J.-M. Veillon.
⇒ ***Caliciopsis xanthostemonis*** Huguenin - Cah. Pacifique 13: 302. 1969. H: **PC** (NC 67-082). On living leaves of *Xanthostemon baudounii* Guillaumin (Myrtaceae), Néhoué, 20 IV 1967, NC, leg. H. S. McKee.
⇒ ***Capnodium anonae*** Pat.- Bull. Trimestr. Soc. Mycol. France 20: 135. 1904. H: **FH** No. 7758. On living leaves of *Annona squamosa* L. (Annonaceae), Island of Mangareva, Gambier Archipelago, FP, leg. L. G. Seurat.

A second specimen developing on the same host was later collected by Seurat in the Island of Rikitea (Patouillard, 1906). Such probably corrresponds to the material now present in PC and annotated: *Capnodium anona* Pat., leg. Seurat, Rikitea, on *Anona squamosa.* According to von Arx & Müller (1975) *Capnodium* Mont., type species *C. salicinum* Mont., contains about 15 species. A modern account of this group of bitunicate ascomycetes is still awaited.

⇒ ***Catabotrys deciduum*** (Berk. & Broome) Seaver & Waterston - Mycologia 38: 184. 1946.
= *Catabotrys palmarum* (Pat.) Theiss. & Syd. - Ann. Mycol. 13: 297. 1915.
≡ *Bagnisiella palmarum* Pat. - Bull. Soc. Mycol. France 3: 176. 1887. H: **PC**. On fallen palm leaves, NC (Mus. Neo. Cal. No. 743), leg. and date of collection not specified in the description.

Listed by Pfister (1977) but without a specimen number indicating the absence of any material at FH. But in PC there exists an authentic collection annotated: *Bagnisiella palmarum* Pat. *Typus* !, Mus. Néocal. 743. The distribution of this pantropical ascomycetes has been recently documented Barr (1990).

⇒ ***Cenangium tahitense*** Pat. - Bull. Soc. Mycol. France 12: 135. 1896. H: **FH** No. 5414. Parasitic on perithecia of a *Hypoxylon* sp. developing on a tree trunk, Island of Tahiti, FP, leg. and date of collection not specified.

No part of the original collection is yet available from PC. At FH, the original specimen is simply annotated: Herbier Pancher (Pfister, pers. comm.). *Cenangium* Fr. currently is placed in subfamily *Encoelioideae* of the *Leotiaceae* (Zhuang, 1988). However, a modern revision of taxa ascribed to that genus is needed.

⇒ ***Chaetomium nova-caledonicum*** Udagawa, Uchiyama et Kamiya [as '*novae-caledonicum*'] - Mycoscience 35: 324. 1994. H: **BF** 47541 (**CBM**). The selected living material was isolated from a sample of forest soil collected between the cities of Nouméa and Yaté, Southern Province of NC.
⇒ ***Clintoniella incarnata*** (Pat. & Har.) Sacc. & Trott. - Syll. Fung. 22: 480. 1913.
≡ *Hypocrea incarnata* Pat. & Har. - Bull. Trimestr. Soc. Mycol. France 22: 120. 1906. H: **FH** No. 6816. On bark of twigs, Samoa Island, SP, leg. C. G. Lloyd.

In PC, there is no material of *Hypocrea incarnata.* The Farlow specimen was collected by C. G. Lloyd in the course of a 10-week stay in Samoa during the winter of

1899-1900 (Blackwell & Powell, 1996). *Clintoniella* (Sacc.) Rehm is a synonym of *Hypomyces* (Fr.) Tul. (Rogerson, 1970), but names have not yet been redisposed.
⇒ ***Daldinia caldariorum*** Henn. - Verh. Bot. Ver. Prov. Brand. 40: 158. 1898.
= *Daldinia cognata* Har. & Pat. - J. Bot. (Morot) 17: 15. 1903. H: **FH** No. 6964; synonymy *fide* Ju & Rogers, 1997. For other synonyms, see Ju & Rogers, 1997. On dead trunk of an *Acacia* sp., Tendéa, District of La Foa, I 1900, NC, leg. J. Bernier (Herb. Mus. Cal. No. 74 p.p.).

In PC, an original specimen is labelled: *Daldinia cognata* Har. & Pat. ! ! no. 74 p.p., sur *Acacia* mort, fév. 1900 (indicated January 1900 in the publication); Tendéa, La Foa, Nouv. Calédonie. *Daldinia* Ces. & De Not. has been the subject of a conservation procedure but Laessoe (1994) considers this genus as a synonym of *Hypoxylon* Bull.

⇒ ***Depazea celastrina*** Lév. - Ann. Sci. Nat., Bot. 3ème sér., 3: 55. 1845. H: **PC**. On leaves of *Celastris* sp., IV 1794, NC, leg. J. La Billardière (Herb. Mus. Par.).

An authentic collection is preserved in PC. It is annotated: Herb. Mus. Paris; *Depazea celastrina* Lév., Ann. Sci. nat. 1845, *Nova Caledonia, in folii Celastri* Lév. The type species of *Depazea* Fr., *D. frondicola*, was published as an ascomycete but proved to represent a coelomycete with further investigations, placing *Depazea* as a synonym of *Asteroma* DC : Fr. (Sutton, 1977).

⇒ ***Diatrypella fourcroyae*** Vouaux - Bull. Trimestr. Soc. Mycol. France 26: 155. 1910. H: **?**. On stems of *Fourcraea gigantea* Vent. (Amaryllidaceae), Magenta, Nouméa, NC, leg. Mme Cacot *via* Docteur Bouly de Lesdain.

No authentic material is available at PC. Four years after this publication, l'abbé Léon Vouaux lost his life at the beginning of the first world war. Most of the work he conducted was based on material put at his disposal by the famous physician and amateur lichenenologist Bouly de Lesdain from Dunkerke (Vouaux, *l. c.* 1912: 178). This city was completely destroyed during the second world war and the de Lesdain herbarium was lost.

⇒ ***Didymosphaeria coryneliae*** Spooner - Trans. Brit. Mycol. Soc. 85: 545. 1985. H: **K**, McKee No. 17966 A. Parasitic on ascocarps of *Corynelia uberata* Fr. in *Podocarpus sylvestris* Buch. (Podocarpaceae), Mount Koungouhaou, 8 XI 1967, NC, leg. H.S. McKee.

Didymosphaeria Fuckel was recently monographed by Aptroot (1995). Only six species were then accepted. The Neocaledonian collection was found to represent typical *Didymosphaeria futilis* (Berk. & Broome) Rehm. Aptroot based this decision on his inability to observe the striate ornamentation of the ascospores mentioned in the original description. He suggested such striations might only represent folds due to decay. However according to Spooner (pers. comm.), the collection from New Caledonia has clearly striate ascospores and thus should be considered to represent a taxon distinct from *Didymosphaeria futilis*.

⇒ ***Encoelia heteromera*** (Mont.) Nannfeldt - Trans. Brit. Mycol. Soc. 23: 239. 1939.
= *Encoelia neocaledonica* Wakefield - J. Linn. Soc., Bot., 46: 93. 1922. H: **K**. On dead trunks in the forest, X 1914, NC, Prof. R. H. Compton's collection No. 2194.

Nannfeldt (1939) suggested that *Encoelia neocaledonica* was a probable synonym of *E. heteromera*. Spooner (pers. comm.) re-examined authentic material of the former and confirmed Nannfeldt's opinion. Material examined by Wakefield (1922) was transferred from **BM** to **K** in 1969.

⇒ ***Entonaema cinnabarina*** (Cooke & Massee) Lloyd - Mycol. Notes Lloyd Libr. Mus. 7(4): 1203. 1923.

= *Sarcoxylon aurantiacum* Pat.- Bull. Soc. Mycol. Fr. 27: 331. 1991. H: **FH** No. 7052. The type of *Sarcoxylon aurantiacum* was observed on dead wood, Iles des Pins, NC, leg. A. J. Le Rat.

In PC no authentic material is available. *Sarcoxylon* (Jungh.) Cooke and *Entonaema* A. Moell. were reconsidered by Rogers (1981). The Neocaledonian collection of *Entonaema cinnabarina* was described as *Sarcoxylon aurantiacum* by Patouillard (1911) on his assumption *Entonaema* was identical to *Sarcoxylon*. Lloyd (1923) however accepted the former genus and transferred to it Patouillard's fungus. He also considered *Entonaema aurantiacum* as distinct from *E. cinnabarina.*

Later Rogers (1981) studied authentic material of the South Pacific taxon from FH and other collections of *Entonaema cinnabarina* and *E. aurantiacum*. He concluded this fungus is an *Entonaema* rather than a *Sarcoxylon*. Rogers gives the following indications for the material loaned from FH: Le Rat No. 192, V 1909, Iles des Pins, on dead wood; K, part of type FH.

⇒ ***Geoglossum pumilum*** Winter - Grevillea 15: 91. 1887.

= *Geoglossum (Eugeoglossum) noumeanum* Har. & Pat. - J. Bot. (Morot) 17: 15. 1903; H: **FH** No. 4866; synonymy *fide* Spooner (1987). The South Pacific taxon developed on schistous soil, around Nouméa, VIII 1900, NC, leg. J. Bernier (Mus. Neo. Cal. No. 134).

In PC, another authentic collection is annotated: *Geoglossum noumeanum* Har. & Pat. ! no. 134; Nouméa, août 1900, Nlle Calédonie. Spooner (1987) gives the following annotations for the FH specimens he examined: New Caledonia, Nouméa, terrestrial, undated, leg. J. Bernier (Holotype of *G. noumeanum*); Nouméa, terrestial, undated, leg. M. Le Rat 1122 (not 7122 as erroneously indicated). In FH the two representative collections are annotated: Nouvelle Calédonie, Bernier and Nouvelle-Calédonie, Le Rat 1122, Boussuea (Pfister, pers. comm.).

⇒ ***Gibbera pezizoidea*** Pat. - Bull. Soc. Mycol. France 3: 176. 1887. H: **PC**. On bark of trees, Bourail, NC, leg. Balansa, 1868-1870.

Listed by Pfister (1977) but without a specimen number indicating the absence of an original collection at FH. In PC, an authentic specimen bears the following indications: *Gibbera pezizoidea* Pat. ! ! n. sp.: Nouvelle-Calédonie. M. Balansa 1868-1870 (plus 1 drawing). Although several interesting taxonomic papers relate to taxa ascribed to *Gibbera* Fr., none is regarded as a monograph (von Arx & Müller, 1984; Sivanesan, 1984).

⇒ ***Gloniella insularis*** Vouaux - Bull. Trimestr. Soc. Mycol. France 26: 156. 1910. H : **?**. Developed on an unknown wood cortex, Ile des Pins, NC, leg. Mme Cacot *via* Docteur Bouly de Lesdain.

No material exists in PC. As noted above, specimens of ascomycetes described by Vouaux (1910) should be considered as lost (see *Diatrypella fourcroyae*).

⇒ ***Gloniopsis xylogramma*** Vouaux - Bull. Trimestr. Soc. Mycol. France 26: 157. 1910. H: **?**. On an unknown decaying wood, Nouméa, NC, leg. Mme Cacot *via* Docteur Bouly de Lesdain.

⇒ ***Herpotrichia erythrinae*** Huguenin - Bull. Trimestr. Soc. Mycol. France 81: 703. 1965. H: **IMI** 102774 ex NC 63-062. On dead twigs of *Erythrina indica* Benth. (Leguminoseae*)*, Bourail, 8 V 1963, NC, leg. B. Huguenin.

Herpotrichia Fuckel was revised by Sivanesan (1971), who recognized eighteen species including *H. erythrinae*. He also provided an enlarged description and illustration of this fungus. The part of this collection now available at Paris should thus be considered as an isotype. This ascomycete has apparently not been collected elsewhere than the type locality.

Barr (1984) concluded North American species that key to *Herpotrichia* are heterogeneous. Known taxa of the genus were thus distributed by her over six genera belonging to different families of at least three different orders. The species from New Caledonia was renamed *Byssosphaeria erythrinae* (Huguenin) Barr. Von Arx & Muller (1984) disagreed with Barr arguing that *Herpotrichia* as delimited by previous authors is a monophyletic entity.

⇒ ***Hugueninia freycinetiae*** Bezzera & Barros in Bezzera, Barros & Leal - Publ. Univ. Recife Inst. Micol. 643: 5. 1970. H: **Recife.** On leaves of *Freycinetia longispica* Martelli (Pandanaceae), NC, leg B. Huguenin.

In the recent issue of the Outline of the Ascomycetes, this genus is considered as doubtful (Eriksson & Hawksworth, 1993).

⇒ ***Humaria lloydiana*** Bres. & Pat. - Mycol. Notes Lloyd Libr. Mus. 1(6): 50. 1901. H: **FH** No. 4953. Collected on the island of Upola, Samoa (No. 5019), SP, leg. C. G. Lloyd. No authentic specimen is available at PC.

⇒ ***Hypocrea mesenterica*** Bres. & Pat. - Mycol. Notes Lloyd Libr. Mus. 1(6): 50. 1901. H: **FH** No. 6824. Collected on the island of Upola, Samoa (No.5017), SP, leg. C. G. Lloyd. No other original material is present at PC.

⇒ ***Hypoxylon haematostroma*** Mont. var. ***leratii*** Pat. - Agric. Prat. Pays Chauds 5: 526. 1905. H: **PC**. Observed on a dead trunk, Yahoué, NC (Mus. Neo. Cal. No. 1185), leg A. J. Le Rat.

The variety is not listed by Pfister (1977). In PC an authentic specimen has the following indications: *Hypoxylon haematostroma* v. Le Rati Pat. ! !; Nlle Calédonie: Yahoué. M. Le Rat no. 1105. The taxonomic position of this variety was not reconsidered by Miller (1961) or by Ju & Rogers (1996).

Recently Rogers (in litt.) examined the above cited specimen. He concluded such material differs from typical *Hypoxylon haematostroma* in somewhat shorter, broader ascospores, i.e. (11-) 12-15 x 8-9 (-9.5) µm *versus* the typical 13.5-18 (-19) x 7-8 (-8.5) µm. Ascospore germ slits are also shorter than typical. The surface color of the stroma has been ruined; its true color is thus impossible to know. The long tubular perithecia reach almost 4 mm, a length seldom seen in any *Hypoxlyon*. Thus, this collection might represent a distinct variety but the material is too poor to be certain.

⇒ ***Isia neocaledoniensis*** (C. Moreau) D. Hawksworth & Manoharachary - Trans. Brit. Mycol. Soc. 71: 334. 1978.

≡ *Thielavia neocaledoniensis* C. Moreau in B. Huguenin - Bull. Trimestr. Soc. Mycol. France 81: 699. 1966. H: strain Huguenin M 75, lost.

A living strain was isolated by Huguenin from fresh leaves of *Pandanus* sp. in NC. The subsequent discovery of two fresh specimens of this fungus also on leaves of a *Pandanus* sp. from India allowed the establishment of an appropriate genus for this ascomycete. *Isia* differs from *Thielavia* by having ostiolate ascomata, asci with a distinct apical annular ring and ascospores with verruculose walls.

⇒ ***Kretzschmaria*** sp.

= *Hypoxylon neocaledonicum* Har. & Pat. - J. Bot. (Morot) 17: 14. 1903. H: **FH** No. 6901; synonymy *fide* Ju & Rogers (1996).

The South Pacific specimen developed on dead wood, Coindé, Canala, NC, II.1901, leg. J. Bernier (Mus. Neo. Cal. No. 1073). An isotype is still present in PC: *Hypoxylon neocaledonicum* Har. & Pat. ! Coindé (Canala) no. 1073. Fev. 1901, Nlle Calédonie. The species was not treated by Miller (1961), but Ju & Rogers (1996) reconsidered the status of this ascomycete. Examination of the FH holotype proved it represents a species of *Kretzchmaria* Fr. It however 'differs from other *Kretzschmaria* taxa in having turbinate to peltate stromata which are discrete rather than more or less united by a common stipe'.

Two other specimens from NC maintained at FH also proved to represent the same fungus. These were annotated: *Phylacia neocaledonica* Pat. & Har., on wood, Le Rat, 1907. However, this latter binomial was never published by the French authors. Ju & Rogers (1996) also found *Hypoxylon sphaericum* Pat. [Bull. Trimestr. Soc. Mycol. France 40: 35. 1924] collected at Nam Kep, Tonkin to match the Neocaledonian collection.

⇒ ***Kretzschmaria heliscus*** (Mont.) Massee - Kew Bull. 1898: 118. 1898; van der Gucht - Bull. Jour. Bot. Belg. 64: 313. 1995.

= *Kretzschmaria scruposa* Har. & Pat. - J. Bot. (Morot) 17: 14. 1903. H: **FH** No. 3889.

The South Pacific fungus developed on a decomposing calyx of *Aleuritis* sp., Yahoué, VI.1900, NC, leg. J. Bernier (Mus. Néo. Cal. No. 68). An additional original collection is present in PC: *Kretzschmaria scruposa* Har. & Pat. !, sur Brancoulier, no. 60, Yahoué, juin 1900, nouv. Calédonie.

⇒ ***Lachnea cocoes*** (Pat.) Sacc. & Trott. - Syll. Fung. 22: 630. 1913.

≡ *Ciliaria cocoes* Pat. - Bull. Trimestr. Soc. Mycol. France 22: 52. 1906. H: **FH** No. 4819.

Observed on decaying trunk of *Cocos nucifera* L. (*Palmae*), Taravao, Island of Tahiti, FP, leg. L. G. Seurat. No part of the original material is preserved at PC either under the generic epithets *Ciliaria* or *Lachnea.*

⇒ ***Lasiosphaeriella nooniae-daniae*** (Carroll & Munk) Sivanesan - Trans. Br. Mycol. Soc. 64: 444. 1975.

≡ *Lasiosphaeria nooniae-daniae* Carroll & Munk - Mycologia 56: 87. 1964. H: **C**.

On rotten wood in lowland tropical rain forest at Rennel, Solomon Islands, alt. 100 m, 20 IX 1962, SP, leg. H. Dissing. The fungus was collected during the 1962 Danish Noona-Dan Expedition to the South Pacific islands, hence the specific epithet. Sivanesan (1975) proposed *Lasiosphaeriella* to segregate taxa formerly ascribed to both *Lasiosphaeria* Ces. & De Not. and *Cercophora* Fuckel lacking apical apparatus in the asci but with ascospores surrounded by a mucilaginous sheath.

⇒ ***Lembosia tenella*** Lév. - Ann. Sci. Nat., Bot. 3ème sér., 3: 58 1845. H: **?**. On leaves of *Myrtaceae*, Island of Tahiti (no other indications provided), FP.

No original material is available at PC. *Lembosia* Lév. was established in this publication with *L. tenella* being the first cited species. But according to von Arx & Müller (1975) the genus is based on *Lembosia melastomatum* Mont. and the forty species ascribed to this genus or to its four synonyms are in need of a modern re-evaluation.

⇒ ***Leptosphaeria australis*** (L. Crié) Sacc. - Syll. Fung. 2: 54. 1883.
≡ *Depazea australis* L. Crié - Ann. Sci. Nat., Bot. 6ème sér., 7: 46. 1878. H: ?.

On living leaves of *Eustrephia* sp., NC and Australia, on plants collected by E. Vieillard. No authentic material of this fungus is filed in PC either under *Depazea* or *Leptosphaeria*. Crié examined plant material collected in New Caledonia by Brongniart and Bureau. Apparently Crié made no attempt to segregate material of the fungi he proposed as new from the plant specimens, so annotations of this author on plant sheets should be studied for type material.

⇒ ***Lophiosphaera tahitensis*** Pat. - Bull. Trimestr. Soc. Mycol. France 22: 58. 1906. H: **FH** No. 5435. In the endocarp of a *Cocos nucifera* L. seed (*Palmae*), Tahiti, FP, leg L. G. Seurat.

No further original material has been preserved in PC. L*ophiosphaera* Trev. is now considered a synonym of *Lophiostoma* Ces. & De Not. (von Arx & Müller, 1975), but the fungus originating from Tahiti was not treated by Chesters & Bell (1970) in their revision of *Lophiostoma* and allied taxa.

⇒ ***Meliola albizziae-granulosae*** Huguenin - Rev. Mycol. (Paris) 34: 34. 1969. H: **PC** (NC 66-165). On leaves of *Archidendropsis granulosa* (Labill.) Nielsen [= *Albizia granulosa* (Labill.) Benth.] (Leguminaceae*)*, Monts Koghis, Nouméa, 31 X 1966, NC, leg. B. Huguenin.

⇒ ***Meliola alstoniae-comptonii*** Huguenin - Rev. Mycol. (Paris) 34: 51. 1969. H: **PC** (NC 67-043). On leaves of *Alstonia lenormandii* var. *comptonii* (S. Moore) Bor (= *Alstonia comptonii* S. Moore) (Apocynaceae*)*, Col d'Amieu, La Foa, 20 IV1967, NC, leg. B. Huguenin.

⇒ ***Meliola alyxiicola*** Huguenin - Rev. Mycol. (Paris) 34: 52. 1969. H: **PC** (NC 66-152). On leaves of *Alyxia leucogyne* van Heurck & Müll. Arg. (Apocynaceae), Montagne des Sources, Nouméa City, 5 X 1966, NC, leg. B. Huguenin.

⇒ ***Meliola calpidiae*** Huguenin - Rev. Mycol. (Paris) 34: 25. 1969. H: **PC** (NC 66-143). On leaves of *Calpidia artensis* Van Heurck & Müll. Arg. *(*Apocynaceae), Hienghène, 14 X 1966, NC, leg. A. Nothis.

⇒ ***Meliola choryzandrae*** Huguenin - Rev. Mycol. (Paris) 34: 57. 1969. H: **PC** (NC 66-126). On leaves of *Choryzandra cymbaria* R. Br. (Cyperaceae), Montagne des Sources (800 m), close to Nouméa City, 5 X 1966, NC, leg. B. Huguenin.

⇒ ***Meliola codiae*** Huguenin - Rev. Mycol. (Paris) 34: 32. 1969. H: **PC** (NC 67-040). On leaves of *Codia spatulata* Brogn. & Gris (Cunnoniaceae), Col d'Amieu, 20 IV 1967, NC, leg. B. Huguenin.

⇒ ***Meliola comptonellae*** Huguenin - Rev. Mycol. (Paris) 34: 38. 1969. H: **PC** (NC 66-106). On leaves of *Comptonella drapacea* (Labill.) Guillaumin, Montagne des Sources, Nouméa, 16 IX 1966, NC, leg. B. Huguenin.

⇒ ***Meliola couthoviae*** Huguenin - Rev. Mycol. (Paris) 34: 47. 1969. H: **PC** (NC 67-046). On leaves of *Couthovia neocaledonica* Gilg. & Benedict (Loganiaceae), Col d'Amieu, La Foa, 20 IV1967, NC, leg. B. Huguenin.

⇒ ***Meliola dognyensis*** Huguenin - Rev. Mycol. (Paris) 34: 53. 1969. H: **PC** (NC 66-176). On leaves of *Randia sezitat* Guillaumin (Rubiaceae), Forêt de Dogny, 29 X 1966, NC, leg. B. Huguenin.

⇒ ***Meliola dysoxyli-nitidi*** Huguenin - Rev. Mycol. (Paris) 34: 42. 1969. H: **PC** (NC 67-044). On leaves of *Dysoxylum rufescens* Vieill. ex Sébert & Pancher (= *Dysoxylon nitidum* C. DC.) (Meliaceae), Thio, 6 VIII 1966, NC, leg. H. S. McKee No. 15425.
⇒ ***Meliola dysoxyli-nitidi*** Huguenin var. ***minor*** Huguenin - Rev. Mycol. (Paris) 34: 42. 1969. H: **PC** (NC 67 045). On leaves of *Dysoxylum* sp., Col d'Amieu, La Foa, 20 IV 1967, NC, leg. B. Huguenin.
⇒ ***Meliola evodiae*** Pat. - Rev. Mycol. (Toulouse) 10: 139. 1888. H: **FH** No. 7652. On both sides of leaves of an *Evodia* sp., Island of Samoa, (leg. and date of collection not specified), SP. The original material at FH is simply annotated: *in fol. Evodiae* (Pfister, pers. comm.).
⇒ ***Meliola grevillae-gilivrayi*** Huguenin - Rev. Mycol. (Paris) 34: 26. 1969. H: **PC** (NC 66-131). On leaves of *Grevillea gillivrayi* Hook (Proteaceae), Plaine des Lacs, 6 X 1966, NC, leg. B. Huguenin.
⇒ ***Meliola kisubiensis*** Hansf. var. ***acronychiae*** Huguenin - Rev. Mycol.(Paris) 34: 40. 1969. H: **PC** (NC 66-139). On leaves of *Acronychia laevis* Forst. (Rutaceae), Hienghène, 14 X 1966, NC, leg. A. Nothis No. 22.
⇒ ***Meliola montisfontium*** Huguenin - Rev. Mycol. (Paris) 34: 44. 1969. H: **PC** (NC 66-124). On leaves of *Schefflera cerifera* Harms (Araliaceae), Montagne des Sources, Nouméa City, 5 X 1966, NC, leg. B. Huguenin.
⇒ ***Meliola mouensis*** Huguenin - Rev. Mycol. (Paris) 34: 40. 1969. H: **PC** (NC 67-018). On leaves of *Comptonella oreophila* (Guillaumin) H. Hartley (= *Evodia oreophila* Guillaumin) (Rutaceae), Mount Mou, 27 XII 1966, NC, leg. B. Huguenin.
⇒ ***Meliola nothofagi*** Huguenin - Rev. Mycol. (Paris) 34: 36. 1969. H: **PC** (NC 67-017). On leaves of *Nothofagus baumanii* (Baum.-Böd.) Steenis (Fagaceae), Mont Mou, 27 XII 1966, NC, leg. J.-M. Veillon.
⇒ ***Meliola osmanthi-cymosi*** Huguenin - Rev. Mycol. (Paris) 34: 48. 1969. H: **PC** (NC 67-033). On leaves of *Osmanthus cymosus* (Guillaumin) P.S. Green (Oleaceae), Dôme de la Tiebaghi, 9 XII 1963, NC, leg. P.S. Green.
⇒ ***Meliola oxerae*** Huguenin - Rev. Mycol. (Paris) 34: 54. 1969. H: **PC** (NC 67-012). On leaves of *Oxera robusta* Vieill. (Verbenaceae), Forêt du Mois de Mai, Nouméa City, 5 I 1967, NC, leg. B. Huguenin.
⇒ ***Meliola stenocarpi*** Huguenin - Rev. Mycol. (Paris) 34: 26. 1969. H: **PC** (NC 66-061). On leaves of *Stenocarpus umbelliferus* (J. R. & G. Forster) Druce (Proteaceae), Col de Petchikara, 17 VIII 1966, NC, leg. B. Huguenin.
⇒ ***Meliola tahitensis*** Pat. ex Hansf. in Hansford - The Meliolinae. A Monograph, Sydowia Beih. 2: 763. 1961. H: **FH** No. 7711. On leaves of an unknown plant (Dicotyledon), Island of Tahiti, (*s. d.*) FP, Herb. I. Pancher No. 10 in Herb. Patouillard at Farlow, *typus* (Hansford, 1961).

According to Hansford (1961), this *Meliola* is so distinctive as to warrant description as new, inspite of the uncertain host. The fungus was found in Patouillard's herbarium under the above apparently unpublished name.

⇒ ***Meliola tieghemopanacis*** Huguenin - Rev. Mycol. (Paris) 34: 45. 1969. H: **PC** (NC 66-123). On leaves of *Tieghemopanax* sp., Montagne des Sources, Nouméa City, 5 X 1966, NC, leg. B. Huguenin.

⇒ ***Meliola venezuelana*** Orejuela var. ***neocaledonica*** Huguenin - Rev. Mycol. (Paris) 34: 35. 1969. H: **PC** (NC 64-395). On stems of *Mimosa invisa* Mart. ex Colla, road to Yaté between the cities of Nouméa and Yaté, 10 VII 1964, NC, leg. B. Huguenin.

⇒ ***Meliolina novae-caledoniae*** S. Hughes - Mycol. Pap. 166: 110. 1993. H: **PC**. On leaves of *Tristaniopsis glauca* Pancher ex Brongn. & Gris (= *Tristania glauca*) (Myrtaceae*)*, Prony, (locality ?), 1909, leg. M. & Mme A. J. Le Rat No. 543, NC; specimen incorrectly identified as *Meliola cladotricha* Lév. [now *Meliolina cladotricha* (Lév.) H. Sydow & Sydow], originally described from Bornéo.

Several collections of this fungus were examined by Hughes (1993). Its known distribution is still limited to New Caledonia where it probably also develops on *Tristaniopsis calobuxus. Meliolina degeneri* Hughes, type from Molokai, Hawaiian Islands, is the second member of the genus also collected in New Caledonia on *Metrosideros microphylla* (Hughes, 1993).

For the South Pacific region, *Meliolina cookii* Hughes (distribution limited to Cook islands) and *M. samoensis* Hughes (distribution limited to Samoa) are additionnal valid records (Hughes, 1993).

⇒ ***Microcyclus niaouli*** Huguenin - Cah. Pacifique 13: 296. 1969. H: **PC** (NC 66-001). On living leaves of *Melaleuca quinquenervia* (Cav) S. T. Blake (= *M. leucodendron* L.) (Myrtaceae*)*, La Crouen, 11 VII 1964, NC, leg. B. Huguenin.

⇒ ***Microcyclus pandani*** Huguenin - Bull. Trimestr. Soc. Mycol. France 80: 178. 1964. H: **PC** (PS 59-094). On living leaves of *Pandanus tectorius* Soland. ex Park (Pandanaceae), Bora Bora, Iles sous le Vent, Tahiti, Society Islands, FP, leg. R. Millaud.

This taxon has apparently not been recorded since its description.

⇒ ***Micropeltis bambusae*** Pat. - Bull. Trimestr. Soc. Mycol. France 22: 5. 1906. H: **FH** No. 6985. On bamboo culms, Papeenoo, Island of Tahiti, FP, leg. L. G. Seurat.

No part of the original material is preserved at PC. This fungus was not considered by Batista (1959) in his revision of the genus.

⇒ ***Micropeltis hymenophylli*** Pat. - Bull. Soc. Mycol. France 3: 126. 1887. H: **FH** No. 6990. Developed in large numbers on the fronds of a *Hymenophyllum* sp., Island of Tahiti (Herb. Mus. Par.: in the description), FP (leg. and date of collection not specified in the description).

In PC there exists an original specimen (isotype ?) annotated: *Micropeltis hymenophylli* Patouillard ! sp. nov., Tahiti. At FH, the corresponding material has the following notations: Col. I. Vesco, 1847, Tahiti (Marquese); Pfister, pers. comm. The position of this taxon needs to be re-evaluated having not been considered by Batista (1959).

⇒ ***Montagnella alyxiae*** Pat. & Har. - Bull. Trimestr. Soc. Mycol. France 28: 284. 1912. H: **FH** No. 7196. Developing on the tumours of living *Alyxia* sp. branches, Tahiti, PF, leg. I. Pancher (*s. d.*).

No part of the original material is preserved at PC.

⇒ ***Morchella anteridiformis*** Heim - Bull. Trimestr. Soc. Mycol. France 82: 442. 1966: only description in French; Rev. Mycol. 31: 158. 1966: latin diagnosis. H: **PC** (No. NC 500: R. Heim). On forest soil, Mount Koghis, close to Nouméa City, alt. 900 m, 3 VI 1956, NC, leg. R. Heim.

According to Heim (1966), this authentic material corresponds apparently to the first record of the genus *Morchella* Dill. in NC. In the same publication, Heim described a second species, *Morchella rigidioides*, based on material collected in New Guinea. The type specimen developed on soil close to the village of Kondambi, locality of Minj at about 1700 m, Western Highlands, New Guinea, late IX.1963, leg R. Heim; type PC: Western Highlands No. 43 b. The geographic origin of this ascomycete was erroneously cited as New Caledonia (*l. c.*) in the Index of Fungi III (13): 411. 1967.

⇒ ***Nectria inocarpi*** Pat. - Bull. Trimestr. Soc. Mycol. France 22: 58. 1906. H: **FH** No. 6684. Between the fibers of a decomposing fruit of *Inocarpus edulis* Forster (Leguminosae), Tahiti, leg. L. G. Seurat, FP.

No material is preserved at PC.

⇒ ***Nectria nigro-ostiolata*** Wakefield in Wakefield *et al*. - Vierteljahrsschr. Naturf. Ges. Zürich 61: 631. 1916. H: **K**. On wood, Médou, Island of Maré, Loyalty Islands, 1912, NC, leg. Sarasin & Roux No. 146.

⇒ ***Nummularia oospora*** Vouaux - Bull. Trimestr. Soc. Mycol. France 26: 155. 1910. H: **?**. On dacaying wood, Nouméa, NC, leg. Mme Cacot *via* Docteur Bouly de Lesdain.

No authentic material is present at PC and should be considered as lost (see comment under *Diatrypella fourcroyae*).

⇒ ***Oxydothis pandani*** Huguenin - Bull. Trimestr. Soc. Mycol. France 80: 175. 1964. H: **IMI** 113480; Isotype **PC** (PS 62-233). On withered leaves of *Pandanus tectorius* Solander ex Parkinson (Pandanaceae), Rurutu, Tubuai Island (Austral Islands), 12 X 1962, FP, leg. B. Huguenin.

Oxydothis Penzig & Sacc. has been the subject of a recent revision (Hyde, 1994) and *O. pandani* was also recorded in Hawaii some decades before its discovery in New Caledonia under the binomial *Schizochora pandani* Stev.

⇒ ***Parastigmatea pandani*** Huguenin - Bull. Trimestr. Soc. Mycol. France 80: 181. 1964. H: **PC** (NC 58 092). On dead leaves of *Pandanus tectorius* Solander ex Parkinson (Pandanaceae), Lifou, Loyalty Islands, NC, leg. J. Marty.

⇒ ***Phragmonaevia (s.g. Naeviella) lignicola*** Vouaux [as '*Phragmonoaevia*'] - Bull. Trimestr. Soc. Mycol. France 26: 154. 1910. H: **?**. On unknown old wood, Nouméa, NC, leg. Mme Cacot *via* Docteur Bouly de Lesdain.

No material is preserved at PC. *Phragmonaevia* Rehm is regarded as a *nomen dubium* by Sherwood (1977) since she was unable to characterize its lectotype on the basis of available material. *Naeviella* (Rehm) Clements is also considered by Sherwood as being dubious. Accordingly the exact status of this Neocaledonian fungus is still uncertain.

⇒ ***Phyllachora alyxiae*** Pat. - Bull. Soc. Mycol. France 12: 136. 1896. H: **FH** No. 7062. On the upper side of *Alyxia* sp. leaves, Tahiti, FP, leg. and date of collection not specified.

In PC no part of the original collection has been maintained. At FH the specimen is labelled : Sur *Alyxia*, Herbier Pancher.

⇒ ***Pleomassaria melaleucae*** Huguenin - Rev. Mycol. (Paris) 29: 266. 1964. H: **PC** (NC 63-016). On living twigs of *Melaleuca quinqenervia* (Cav.) S. T. Blake (= *M. leucodendron* L.) (Myrtaceae), Plaine de la Dumbéa, 7 IV 1963, NC, leg. B. Huguenin.

⇒ ***Podospora absimilis*** Cain - Canad. J. Bot. 40: 448. 1962. H: **TRTC** 33718.

The description is based on material developed in moist chambers in the laboratory at Toronto University (March 1957) on horse dung collected on 28 VI 1956 by L. S. Olive, near Tautira, Tahiti, FP. The specific epithet refers to ascospores lacking the distinct appendages characteristic of the genus.

⇒ ***Podospora inflatula*** Cain - Canad. J. Bot. 40: 434. 1962. H: **TRTC** 32681. Ascomata of this fungus developed in moist chambers in the laboratory at Toronto University (March 1957) on horse dung collected on 27 VI 1956 by L.S. Olive, near Tautira, Island of Tahiti, FP. The specific epithet refers to the peculiar inflated cells of the perithecial hairs.

The species was also then recorded on cow dung collected at Sao Leopoldo, Rio Grande do Sul, Brazil.

⇒ ***Podospora prethopodalis*** Cain - Canad. J. Bot. 40: 458. 1962. H: **TRTC** 33715. Ascomata developed on horse dung maintained in moist chambers at Toronto University (June 1958); the dung was collected on VI 1956 by L. S. Olive near Tautira, Island of Tahiti FP. Other records from the same substrate collected by L. S. Olive on IV 1956 are at Afareaita, Moorea (TRTC 33717) and also from Para district on 24 IV 1956 (TRTC 35270), Island of Tahiti, FP.

⇒ ***Poronia caelata*** Pat. - Bull. Trimestr. Soc. Mycol. France 22: 57. 1906. H: **FH** No. 6947. On decaying wood, Papeete, Island of Tahiti, FP, leg. L. G. Seurat.

No part of the original collection is preserved at PC.

⇒ ***Rhytisma austro-caledonicum*** L. Crié - Bull. Soc. Linn., Normandie 8: 444. 1874. H: **?.** On living leaves of *Symplocos gracilis* Brongn., *S. vieillardi* Brongn., *S. lenormandiana* Brongn. & Gris, *S. coerulescens* Brongn. & Gris, *S. arborea* Brongn. & Gris (Symplocaceae), forests of Mount Balade and Wagap, NC, leg. E. Vieillard in Herbarium LeNormand.

No authentic specimen is preserved at PC; see also comment under *Leptosphaeria australis.*

⇒ ***Rosellinia rachidis*** Pat. - Bull. Trimestr. Soc. Mycol. France 22: 57. 1906; XXII: 110. H: **FH** No. 6878; non *Rosellinia rachidis* Rehm - Leafl. Philipp. Bot. 6: 2198. 1914. On foliar rachis of *Cocos nucifera* L. (Palmae), Motu Papeateei, Island of Tahiti, FP, leg. L. G. Seurat.

No part of the original collection is preserved at PC either under *Rosellinia* or *Amphisphaerella.* Recently Laessoe & Spooner (1994) provided a description of this fungus based on specimens other than type material but they refrained from proposing a combination in *Astrocystis* Berk. & Broome pending examination of the type.

⇒ ***Saccardinula tahitensis*** Pat. - Bull. Trimestr. Soc. Mycol. France 22: 55. 1906. H: **FH** No. 6999. On living leaves of *Coffea* sp., Papenoo, Island of Tahiti, FP, leg. L. G. Seurat.

No part of the original collection is preserved at PC.

⇒ ***Sarcosoma leratii*** Pat. - Bull. Trimestr. Soc. Mycol. France 31: 34. 1915. H: **FH** No. 4923. On tree trunks, Mont Mou, NC, leg. Mme L. Le Rat.

The original collection is entirely at FH and the fungus has apparently been overlooked since its description.

⇒ ***Seuratia globifera*** (Ellis & Everhart) Meeker - Canad. J. Bot. 53: 2489. 1975.
≡ *Asterina globifera* Ellis & Everhart - Bull. Torrey Bot. Club 22: 435. 1895.
= *Seuratia vanillae* Pat. - Bull. Trimestr. Soc. Mycol. Fr. 22: 54. 1906. H: **FH** No. 7615; synonymy *fide* Meeker (1975 b). The authentic material of *Seuratia vanillae*

developed on withered leaves of *Vanilla planifolia* L. (Orchidaceae), Papenoo, Island of Tahiti, 1904, FP, leg. L. G. Seurat. The whole original collection is at FH.

When Patouillard (1904) proposed *Seuratia* based on *S. coffeicola*, he overlooked the existence of an anamorphic state. Two years later, Patouillard (1906) ascribed to this genus a second taxon *Seuratia vanillae;* this was associated with an anamorphic state. He also then observed the presence of a conidial state in additionnal colonies of *Seuratia coffeicola* (now *S. millardetii*) developing on coffee leaves growing in Tahiti. No mention was then made by Patouillard of a possible link between his genus and the anamorphic genus *Atichia* Fl. However *Seuratia vanillae* was later tranferred to *Atichia* Fl. by von Höhnel (1910), a genus not then restricted to conidial states only.

Phycopsis Mangin & Patouillard (1912) was based on the type material of *Seuratia vanillae*. It was proposed to segregate known species of *Seuratia* on account of the conidial location being isolated in *Phycopsis* but formed in groups in the former. However such a distinction was later rejected by Meeker (1975 b).

⇒ ***Seuratia millardetii*** (Raciborski) Meeker - Canad. J. Bot. 53: 2485. 1975.

≡ *Atichia millardetii* Raciborski - Parasitische Algen und Pilze Javas 3: 41. 1900.

= *Seuratia coffeicola* Pat. - Bull. Trimestr. Soc. Mycol. Fr. 20: 136. 1904. Syntypes **FH** Nos. 7610 & 7611; synonymy *fide* Meeker (1975 b).The original material of *Seuratia coffeicola* developed on withering leaves of *Coffea arabica* L., Gambier Archipelago, FP, leg. A. J. Le Rat.

No authentic material exists in PC. In the protologue, the existence of an anamorphic state was however over-looked, but subsequently Patouillard (1906) described the conidia of this fungus from colonies on leaves of coffee collected in Tahiti. S*euratia millardettii* proves to be a cosmopolitan fungus developing on leaves of many different vascular plants; it is also known from *Anona squamosa.*

⇒ ***Squamotubera leratii*** Hennings - Hedwigia 42 Beibl. : 308-309. 1903. H: **?.** Growing underground (?), on the hills around Nouméa, NC, leg. A. J. Le Rat.

The genus has no folder in PC and authentic material is no longer preserved in Henning's herbarium at B (Hein, 1988). Hennings (1903) erected *Squamotubera* for the single species *S. leratii* based on material directly sent to him from New Caledonia. But according to Rogers (1981), Hennings conjectured the fungus arises from an underground structure, but gave few details.

Lloyd (1917) noted some similarities between this fungus and *Sarcoxylon compunctum* and indeed called it *S. leratii*. Later Rogers (1981) was however unable to locate Hennings's material but could examine a specimen from FH collected a few years later also from New Caledonia: Le Rat No. 19, VI.1906, 'Parasite sur les vieilles souches de Casuarina; ? Le Rat; maintained as *Penzigia compuncta* (Jungh.) sterile.

Squamotubera is closely related to and probably congeneric with *Sarcoxylon* (Laessoe, 1994; Rogers, 1981). However on the basis of its more or less terrestrial habit, the suspicion that stromata arise from subterranean sclerotia, and its upright stromatal morphology, Rogers (1981) preferred to consider this genus distinct from the latter. Further collections should clarify its true status.

⇒ ***Stigmatea pandani*** Pat. - Bull. Trimestr. Soc. Mycol. France 20: 136. 1904. H: **FH** No. 5297. On living leaves of *Pandanus odoratissimus* L. (Pandanaceae), Island of Mangareva, Gambier Archipelago, FP, leg. L. G. Seurat.

No coresponding material is preserved at PC. A second similar collection was later examined by Patouillard (1906) but this is also not preserved in PC.

⇒ ***Torrubiella ochracea*** Pat. - Bull. Trimestr. Soc. Mycol. France 22: 58. 1906. H: **FH** No. 6752. On the body of an unknown *Lepidoptera* imago, Papenoo, Island of Tahiti, FP, leg. L. G. Seurat.

No part of the original material is filed in PC. Petch (1924) provided an enlarged description of this fungus. However, he made no mention about having examined authentic material.

⇒ ***Tryblidium pandani*** Pat. [as 'Triblidium'] - Bull. Trimestr. Soc. Mycol. France 22: 53. 1906. H: **FH** No. 7224. On leaves of *Pandanus* sp., Rikitea, FP, leg. L. G. Seurat.

The original material is only present at FH.

⇒ ***Trichoglossum hirsutum*** (Pers. : Fr.) Boud. - Bull. Soc. Mycol. France 1: 110. 1885
≡ *Geoglossum hirsutum* Pers. : Fr. - Syst. mycol. 1: 488. 1821.
= *Trichoglossum gracile* Pat. - Bull. Trimestr. Soc. Mycol. France 25: 131. 1909. H: **FH** No. 4871. On mosses on a tree trunk, NC, leg. A. J. Le Rat.

Based on the original description, Mains (1954) considered this fungus to match *Trichoglossum hirsutum*. Spooner (1987) confirmed this proposal by studying type material.

⇒ ***Trichoglossum rasum*** Pat. - Bull. Trimestr. Soc. Mycol. France 25: 13. 1909. H: **FH** No. 4873. On forest soil, Mount Koghis, close to Nouméa City, NC, leg. A. J. Le Rat.

Mains (1954) maintained the fungus in *Trichoglossum* Boud. on account of his examination of authentic material loaned from FH. This was simply annotated : Le Rat No. 122. Spooner (1987) re-examined the material. Curiously this *Trichoglossum* was apparently discovered in Great Britain; however details about its habitat were not given (Greenhalgh, 1980).

⇒ ***Ustulina deusta*** (Hoffm. : Fr.) Petrak - Ann. Mycol., Berl. 19: 279. 1921.
≡ *Sphaeria deusta* Hoffm. - Vegetabilia cryptogamica I: 3, tab. I, fig. 2. 1787; Hoffm. : Fr. - Syst. mycol. II/2: 345. 1823.
= *Nummularia macrospora* Pat. - Bull. Soc. Mycol. France 3: 175. 1887. H: **FH** No. 6932. On tree trunks, NC (Mus. Neo.-Cal. No. 735), leg. and date of collection not specified.

No part of the original collection is maintained at PC. Miller (1961) stated that '*Nummularia macrospora* Pat. according to the type in Lloyd herb. No. 11275 is very similar to *Hypoxylon deustum* (Hoffm. : Fr.) Grev. but ascospores are a little larger than the average European specimen'. Ju & Rogers (1996) re-examined such authentic material and confirmed its identity as *Ustulina deusta*. *Ustulina* Tul. & C. Tul. is however regarded by Laessoe (1994) as a taxonomic synonym of *Kretschmaria* Fr., a proposal not shared by Ju & Rogers (1996) but favoured by Whalley (pers. comm.).

⇒ ***Valsa chlorina*** Pat. - Bull. Trimestr. Soc. Mycol. France 22: 56. 1906. H: **FH** No. 5183. In the pericarp of *Cocos nucifera* L. fruit (Palmae), Papeenoo, Island of Tahiti, FP, leg. L. G. Seurat.

In PC there is no material of this fungus.

⇒ ***Vizellopsis grevilleae*** Batista, Bezerra & Barros apud Batista *et al.* [as '*grewilleae*'] - Publ. Univ. Recife Inst. Micol. 637: 5. 1969. H: **Recife.** On leaves of *Grevillea exile* as '*Grewillea*', locality and date of collection, leg. B. Huguenin, NC.

This is the type species of the still monotypic genus *Vizellopsis* Batista *et al.* The fungus is apparently known only from the original collection.

⇒ ***Xylaria enteroleuca*** (Speg.) P. Martin - J. S. African Bot. 36: 100. 1970.
≡ *Hypoxylon enteroleuca* Speg. - Fungi Argentinensis: 264. 1898.
= *Nummularia artocarpi* Pat. - Bull. Trimestr. Soc. Mycol. France 22: 56. 1906. H: **FH** No. 6920; synonymy *fide* Miller (1961). The original material of *Nummularia artocarpi* developed on leaves of *Arto-carpus* sp., Island of Rikitea, Archipelago of Gambier, FP, leg. L. G. Seurat.

Following Miller (1961), 'The type, herb. Patouillard, sheet 6920, No. 55, in Paris herb. is equal to *Penzigia enteroleuca* (Speg.) Mill.'. The sheet number 6920 correspond to the number of the sheet on which the specimen is mounted at Farlow Herbarium. The figure 55 might represent a specimen number given by Patouillard since other specimens collected by L. G. Seurat were not numbered. No part of the original collection is available at PC.

Examination of cultures derived from fresh material favoured the transfer of this fungus to *Xylaria* Hill (Callan & Rogers, 1990; Martin, 1970).

⇒ ***Xylaria hemiglossa*** Pat. - Bull. Trmimestr. Soc. Mycol. France 18: 301. 1902. H: **FH** No. 7048. On dead trunks, NC (no other details specified).

The fungus has apparently not been re-assessed. It seems close to *Xylaria cubensis* (Mont.) Fr. (Rogers, pers. comm.).

⇒ ***Xylaria hirtella*** Wakefield in Wakefield *et al.* - Vierteljahrsschr. Naturf. Ges. Zürich 61: 63. 1916. H: **K**. On soil at Netché, Mare, Loyalty Islands, NC (No. 144); Képénéé, Lifou, Loyalty Islands (No. 221), 1912-14, NC, leg. Sarasin & Roux Nos. 144 & 221.

While describing *Xylosphaera maitlandii*, Dennis (1958) considered this fungus to be very similar to *Xylaria hirtella* 'a species from New Caledonia with quite different ascospores, slightly phaseoliform, 9-12 x 3.5-4 µm'.

⇒ ***Xylaria polymorpha*** (Pers.) Grev. - Flora edinensis : 355. 1824; Dennis - Kew Bull. 11: 438. 1956.
≡ *Sphaeria polymorpha* Pers. - Flore Agenaise: 520. 1821.
= *Xylaria corrugata* Har. & Pat. - J. Bot. (Morot) 17: 13. 1903. H: **FH** No. 7343; synonymy *fide* Dennis, 1956. The authentic material of *Xylaria corrugata* was observed on dead wood, Mount Mou, District of Houaïlou, NC, III.1901, leg. J. Bernier (Mus. Néo. Cal. No. 81).

In PC two other specimens are still preserved: *Xylaria corrugata* Har. et Pat. ! ! no. 81, sur bois mort, Mt. Mou, Houaïlou, mars 1901, no collector cited (isotype); from Pic Arumbo, M. Le Rat no. 1099 (Nlle Calédonie). Dennis (1956) listed *Xylaria corrugata* as a synonym of *X. polymorpha*. He examined material of the latter collected in several parts of the world. But no indication is given as to whether authentic material of the former was studied.

⇒ ***Xylaria ustorum*** (Pat.) Dennis - Kew Bull. 12: 304. 1957.
≡ *Poronia ustorum* Pat. - Bull. Soc. Mycol. France 3: 175. 1887. H: **PC (?).**
= *Xylosphaera ustorum* (Pat.) Dennis - Kew Bull. 13: 106. 1958; Revista Biol. (Lisboa) 1(3-4): 204. 1958.

Ascomata developing on remaining stumps of burnt graminaceous plants growing around Nouméa City, NC, leg. and date of collection not specified in the description. In PC an original specimen bears the following annotations: *Poronia ustorum* Patouillard ! ! sp. nov., champignon croissant sur les tiges de graminées brulées, Bourail, leg. Vieillard 1869.

In addition to the above, Patouillard (1887a) indicates having also received from M. Gaillard specimens of this curious fungus that also developed on burnt vegetation in a savannah at the foot of mount Cerro Uniana, left side of the river Meseta, High Orénoque, Venezuela. Such locality details correspond to the specimen of *Poronia ustorum* listed by Pfister (1977) under No. 6954. However according to Pfister (pers. comm.) such material is now not available at FH.

Dennis (1957) examined material loaned from FH collected in Venezuela and labelled: 'Sur l'herbe brulée, Savane au pied du Cerro Uniana, rive droite du Rio Meseta, 4.6.1887, leg. Gaillard, in Herb. Farlow'. These details correspond to the second collection of *Poronia ustorum* examined by Patouillard. Dennis concluded the fungus should be considered a species of *Xylaria* Hill : Schrank. However he added 'I have not seen the collection on grass from New Caledonia, which is apparently not in the Patouillard herbarium at Cambridge, Massachusetts' and 'the soft texture of *X. ustorum* and its white surface might lead to its being sought among the Hypocreaceae.'

DISCUSSION

Ascomycetes considered here comprise 105 taxa, a low figure when compared to the potential in species richness of this major fungal group in tropical lands. Material has been collected from a wide geographic area in the South Pacific zone, divided into three main parts: the archipelago of French Polynesia, New Caledonia and Vanuatu on the western side of the Pacific, and the lands between these two entities.

More than two third of taxa retrieved (68.57 %) have their type locality in New Caledonia and nearby islands: Loyalty Islands and Isle of Pines. This finding confirms the comparatively intense collecting effort conducted in this region. The remaining part is largely based on collections from French Polynesia (26.66 %) rather than from Samoa (4.77 %).

Recorded taxa segregate into two distinct groups: specimens found before the first world war and material with collecting dates after World War II. Indeed the above list includes no specimen collected between these two major events. Taxa of the former group were described by mycologists established in European countries, mainly France. The description of a large part of the second group reflects the efforts of mycologists living in Nouméa, largest city in New Caledonia. The earliest record of a collecting date is that of *Depazea celastrina.* The host plant material on which it developed was gathered by the naturalist J. La Billardière in 1794 in New Caledonia.

From a taxonomic point of view, only ten synonymies and ten generic name changes could be located. This observation confirms the need for more taxonomic work to ascertain definite respective taxonomic positions, in particular for binomials of the early collected material. Further, species here considered belong to 65 genera. For the most, each is represented by one taxon only. Among the remainders, *Meliola* ranks first with 23 species; it is followed by *Caliciopsis* and *Xylaria*: 5 species each, and by *Amazonia* and *Podospora* (3 species each.). Finally a group of seven genera have only two representatives: *Asteridiella, Kretzschmaria, Microcyclus, Micropeltis, Nectria, Seuratia* and *Trichoglossum.*

Among recorded genera, six have been proposed after examination of material from the South Pacific. *Lembosia* Lév. (Léveillé, 1845) was established for a specimen collected in Tahiti. *Squamotubera* P. Hennings (Hennings, 1903) was based on a single neocaledonian collection; its inadequate published descriptions throws doubts on the validity of this genus, a situation complicated by the loss of the original matarial. *Seuratia* Pat. (Patouillard, 1904) was maintained by Meeker (1975) but its type species, *S. coffeicola* Pat., reduced to synonymy with *S. millardettii*. *Hugueninia* J. L. Bezzera *et al.* was proposed to accomodate a fungus developing on *Freycinetia longispica* and *Vizellopsis* Batista *et al.* for another one on *Grevillea exile*. Finally, *Isia D.* Hawksw. & Manoharachary (Hawksworth & Manoharachary, 1978) was formulated to accomodate *Thielavia neocaledoniensis* C. Moreau.

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INDEX OF NAME CHANGES

Bagnisiella palmarum	see *Catabotrys palmarum*
Ciliaria cocoes	see *Lachnea cocoes*
Depazea australis	see *Leptosphaeria australis*
Encoelia neocaledonica	see *Encoelia heteromera*
Hypocrea incarnata	see *Clintoniella incarnata*
Hypomyces caledonicus	see *Berkelella caledonica*
Hypoxylon neocaledonicum	see *Kretzschmaria* sp.
Kretzschmaria scruposa	see *Kretzschmaria heliscus*
Lasiosphaeria nooniae-daniae	*see Lasiosphaeriella nooniae-daniae.*
Nummularia artocarpi	see *Xylaria enteroleuca*
Nummularia fusco-disca	see *Biscogniauxia pithodes*
Nummularia macrospora	see *Ustulina deusta*
Phaeopezia tahitensis	see *Aleurina tahitensis*
Phycopsis vanillae	see *Seuratia vanillae*
Poronia ustorum	see *Xylaria ustorum*
Sarcoxylon aurantiacum	see *Entonaema cinnabarina*
Seuratia coffeicola	see *S. millardetii*
Seuratia vanillae	see *Seuratia globifera*
Thielavia neocaledoniensis	see *Isia neocaledoniensis*
Trichoglossum gracile	see *Trichoglossm hirsutum*
Xylaria corrugata	see *Xylaria polymorpha*

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SPECIES OF *BOIDINIA* (BASIDIOMYCOTINA) WITH SIMPLE-SEPTATE HYPHAE

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ABSTRACT

Type specimens of some *Boidinia* species have been studied in order to clarify species differences. This study recognizes seven *Boidinia* species with simple-septate hyphae: *B. borbonica*, *B. cana*, *B. crystallitecta* comb. nov., *B. donkii* comb. nov., *B. lacticolor*, *B. peroxydata*, and *B. propinqua*, and provides a key to these species.

Boidinia Stalpers & Hjortstam is a member of *Gloeocystidiellum* s. l. (Wu, 1996), and is separated from other related genera by combined features of suburniform basidia and verrucose- or aculeate-walled basidiospores. *Boidinia* includes species with clamped or simple-septate hyphae. *Scytinostromella* Parmasto is a genus allied to *Boidinia*, but with branched skeletal hyphae in the subiculum. Ten species of *Boidinia* have been recognized by Wu (1996) in a key to species of this genus.

Some names of members of *Boidinia* have been previously proposed as synonyms by other mycologists. This study aims to clarify species characteristics and differences by examination of type specimens. For example, *Gloeocystidiellum donkii* was regarded by Freeman (1978) as a synonym of *B. propinqua*, but was treated by Hjortstam (1987) as conspecific with *B. lacticolor.* Stalpers (1985) indicated that *Corticium crystallitectum* is the same as *B. peroxydata*, and Hjortstam and Stalpers (1982) treated *G. sibiricum* as a synonym of *B. peroxydata.*

The methods used for studying morphological characters of basidiomata have been previously described by Wu (1990) and Wu (1996). In this study, size of basidiospores was found to be particularly useful for separation of different species. Therefore, careful measurement of basidiospores using a standard method was a prerequisite for this study. Following Wu (1996), 5% KOH was used as mounting medium for measurement of basidiospores, and ornamentation and apiculi were excluded in measurements.

TAXONOMY

key to species of *Boidinia* with simple-septate hyphae

1. Basidiospores > 5.5 μm long 2
1. Basidiospores < 5.5 μm long 4
2. Basidiospores ≧ 5.5 μm wide .... *B. borbonica*
2. Basidiospores mostly < 5.5 μm wide 3
3. Subiculum with dense texture; hyphae thin-walled. Basidiospores mostly < 4.7 μm wide .... *B. crystallitecta*
3. Subiculum with loose texture; hyphae thick-walled. Basidiospores > 4.7 μm wide .... *B. donkii*
4. Subiculum with loose texture .... *B. lacticolor*
4. Subiculum with dense texture 5
5. Basidioma < 100 μm thick. Hymenial surface gray in color .... *B. cana*
5. Basidioma > 100 μm thick. Hymenial surface cream in color 6
6. Basidiospores mostly > 4 μm long .... *B. peroxydata*
6. Basidiospores mostly < 4 μm long .... *B. propinqua*

Boidinia borbonica Boidin, Lanq. & Gilles, Bull. Soc. Mycol. France 113: 11. 1997.

Distribution. Reunion Island (type locality).

Remarks. This species has largest basidiospores (6.2-7.5 × 5.5-6 μm) of any simple-septate species of *Boidinia*.

Boidinia cana Sheng H. Wu, Mycotaxon 58: 15. 1996.

Distribution. Taiwan (type locality), Reunion Island (Boidin et al., 1997).

Remarks. It is noted that specimens collected from Reunion Island have been reported by Boidin et al. (1997) to have larger basidiospores (4-5 x 3.3-4 μm), than those (3.6-4.1 x 3-3.5 μm) measured by Wu (1996) from the type specimen of this species.

Boidinia crystallitecta (G. Cunn.) Sheng H. Wu & P.K. Buchanan, comb. nov.

Basionym. Corticium crystallitectum G. Cunn., Trans. Roy. Soc. New Zealand 82: 296. 1954.

≡ *Gloeocystidiellum crystallitectum* (G. Cunn.) Boidin, Cah. La Maboké 4: 13. 1996.

Specimens studied. NEW ZEALAND. Auckland: Piha, Glen Esk Valley, 300 m, on *Neopanax arboreum*, V-1951, *PDD 11240* (holotype, PDD); on *Letptospermum scoparium*, J.M. Dingley, III-1956, *PDD 17037* (PDD). Cascade Kauri Park, Waitakere Ranges, 300 m, on *Brachyglottis repanda*, III-1950, *PDD 7911* (PDD); Waitakere Ranges, Anawhata Rd, on *N. arboreum*, J.M. Dingley, V-1954, *PDD 15463* (PDD).

Distribution. Known only from New Zealand.

Remarks. Descriptions and line drawings of this species were provided by Cunningham (1963) and Stalpers (1985). Stalpers (1985) considered *Corticium crystallitectum* to be conspecific with *Boidinia peroxydata*, but we find that the two species can be distinguished by basidiospore size. Basidiospores of *C. crystallitectum* have been described as 5-6.5 x 3.5-4.5 μm (Cunningham, 1963) and (4.5-)5-5.5 x 3.5-4.2 μm (Stalpers, 1985). Our measurements of basidiospores from 4 collections (*PDD 7911*, *11240*-holotype, *15463, 17037*) are (5.5-)6-7(-8) x 3.5-5 μm. These measurements are distinctly larger than those of basidiospores from the holotype of *B. peroxydata* (3.8-4.8 x 2.9-3.3 μm) measured in this study.

While examining Cunningham's collections labelled *Corticium crystallitectum* in Herb. PDD, we found that specimens on *Cyathea* (Filicales) represent a discordant element; specimens *PDD 7895* and *17106* have clavate basidia and shorter spores than those of *B. crystallitecta* and appear to belong in *Gloeocystidiellum* s.s.

Boidinia donkii (S.S. Rattan) Sheng H. Wu & P. K. Buchanan, comb. nov.

Basionym. Gloeocystidiellum donkii S. S. Rattan, Biblioth. Mycol. 60: 111. 1977.

Specimen studied. NEPAL: Hathi Ban: Kathmandu, on rotten bamboo sticks, 21-VIII-1969, *SSR 5488* (isotype, K).

Distribution. Known with certainty only from Nepal.

Remarks. Gloeocystidiellum donkii was treated by Freeman (1978) as a synonym of *B. propinqua*, but was treated by Hjortstam (1987) as conspecific with *B. lacticolor*. Basidiospores from the holotype of *G. donkii*, measured as 5.5-6.5 x 4.7-5.3 μm, are larger than those from the holotype of *B. lacticolor* (4.5-5.2 x 3.7-4.2 μm) and those from the holotype of *B. propinqua* (3.3-4 x 2.7-3.2 μm (Wu, 1996)). Basidiospores of *B. donkii* are slightly wider than those of *B. crystallitecta*. The basic difference between these two species is that *B. donkii* has a loose subiculum composed of thick-walled hyphae, while *B. crystallitecta* has a dense subiculum composed of thin-walled hyphae. Freeman (1978) reported that gloeocystidia from the isotype of *B. donkii* have a weakly positive reaction (reddish) in SA. Gloeocystidia from the same material were usually observed as orange-colored in this study, with an SA positive reaction (not strong probably due to long storage of the specimen) but not turning reddish.

Boidinia lacticolor (Bres.) Hjortstam & Ryvarden in Hjortstam, Mycotaxon 28: 19. 1987.

≡ *Gloeocystidium lacticolor* Bres., Hedwigia 56: 303. 1915.

≡ *Gloeocystidiellum lacticolor* (Bres.) Stalpers & Hjortstam in Hjortstam & Stalpers, Mycotaxon 14: 77. 1982.

Specimen studied. PHILIPPINES. Luzon: Benquet, Sablang, Fenix, on *Bambusa*, XII-1910, *Bureau of science no 12853* (holotype, S).

Distribution. Known with certainty only from Philippines.

Remarks. Hjortstam and Stalpers (1982) measured basidiospores from the holotype of *B. lacticolor* as 4.5-5.5 x 4-5 μm, and the same material was measured in this study as 4.5-5.2 x 3.7-4.2 μm. Under this species, Hjortstam (1987) listed several specimens from Kenya and Malawi. One of the listed specimens (*Ryv. 9877*, O) was borrowed for this study, and its basidiospores are much larger (5.5-6.8 x 4.8-5.8 μm) than those of *B. lacticolor*. The dimensions of basidiospores of *Ryv. 9877* resemble those of *B. donkii*, but accurate identification of these African collections needs further study and the distribution of *B. lacticolor* in Africa remains questionable. Hjortstam (1987) considered *B. donkii* to be a synonym of *B. lacticolor*, but as mentioned above the former has larger basidiospores. Hjortstam and Larsson (1994) identified a specimen from India (deposited in K) as *B. lacticolor*. This specimen was originally named by Dr. Rattan as *Gloeocystidiellum odontioides*, but this name has not been formally published. We also found a New Zealand specimen (*PDD 13783*) with characters similar to *B. lacticolor* including spores 4-5 x 3.5-4.5 μm, but with thinner basidioma (40-65 μm thick, cf. up to 200 μm) and shorter gloeocystidia (25-45 x 5.5-9.5 μm, cf. 50-175(-200) x (6-)7-10(-16) μm) than those described for *B. lacticolor* by Hjortstam and Stalpers (1982). This specimen was misidentified by Cunningham as *Corticium corrosum* G. Cunn. (≡ *Amylofungus corrosus* (G. Cunn.) Sheng H. Wu). Among 12 collections so labelled in PDD it is the only specimen of *Boidinia*. Evaluation of whether the New Zealand specimen represents a young *B. lacticolor* or a distinct species will await collections of additional material.

Boidinia peroxydata (Rick) Hjortstam & Ryvarden, Acta Mycoł. Sinica 7: 79. 1988.

≡ *Gloeocystidium peroxydatum* Rick, Brotéria Ser. tri. Gien. Nat. Lisb. 3: 46. 1934.

≡ *Gloeocystidiellum peroxydatum* (Rick) Stalpers & Hjortstam in Hjortstam & Stalpers, Mycotaxon 14: 78. 1982.

Specimen studied. BRAZIL. S. Leopoldo: 1932, *Rick 13382* (neotype, PACA).

Distribution. Brazil, Canada.

Remarks. Hjortstam and Stalpers (1982) described basidiospores of this species as 5 x 3.5-4 µm, while Hjortstam and Ryvarden (1988) described the spores as 4.5-6.5 µm diam in a key couplet applying to both *B. lacticolor* and *B. peroxydata*. However, basidiospores from the neotype of this species were measured in this study as 3.8-4.8 x 2.9-3.3 µm, distinctly smaller than measurements previously reported. Hjortstam and Stalpers (1982) placed *Gloeocystidiellum sibiricum* Parmasto in synonymy with this species, but basidiospores of the isotype of *G. sibiricum* (*E. Parmasto 7779*, GB) were measured as 4.5-5.5 x 3.8-4.5 µm in this study. *Gloeocystidiellum sibiricum* is known only from the type collection from Russia. Mature basidia were difficult to find in the isotype of *G. sibiricum*, but they seem to be clavate instead of suburniform in shape. Therefore this species is still treated as a member of the genus *Gloeocystidiellum*. Earlier measurements of basidiospores of *B. peroxydata* possibly also included elements of *G. sibiricum*. Ginns and Freeman (1994) reported *B. peroxydata* from Canada, based on an Ontario specimen which was identified by Hjortstam. Basidiospores of this specimen were measured by Ginns and Freeman (1994) as 3.8-4(-4.4) x 3-3.6 µm, and agree fairly well with those of the type specimen of *B. peroxydata*. They also noted that their Ontario specimen has much smaller spores than those reported by Hjortstam and Ryvarden (1988) for *B. peroxydata*. Basidiospores of *Boidinia peroxydata* are slightly longer than those of *B. propinqua*. Ginns and Freeman (1994) remarked that their Ontario specimen of *B. peroxydata* is similar to *B. propinqua*, but differs in its sulfo-negative gloeocystidia. The holotype of *B. peroxydata*, however, still shows strong positive reaction in SA, even after a long period of storage.

Boidinia propinqua (Jackson & Dearden) Hjortstam & Ryvarden, Acta Mycol. Sin. 7: 79. 1988.

≡ *Corticium propinquum* Jackson & Dearden, Canad. J. Res., Sect. C, 27: 155. 1949.

≡ *Gloeocystidiellum propinquum* (Jackson & Dearden) Parmasto, Izv. Akad. Nauk Estonsk. S.S.R.14: 225. 1965.

Distribution. North America.

Remarks. Basidiospores of *B. propinqua* was reported by Ginns and Freeman (1994) as 3.8-4(-4.4) x 3-3.6 μm, and those from the holotype of this species were measured by Wu (1996) as 3.3-4 x 2.7-3.2 μm. As mentioned above, basidiospores of *B. peroxydata* are slightly longer than those of *B. propinqua*.

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MYCOTAXON

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MYCENELLA VARIISPORA, A NEW *MYCENELLA* FROM ITALY

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ABSTRACT: A new species, *Mycenella variispora*, characterized by its variously shaped spores, is described from an italian locality. A key of *Mycenella* with both smooth and angular spores is also presented with a table of comparison with *Mycenella favreana* and other *Mycenella* with similar spores.

Key words: *Basidiomycetes, Agaricales, Tricholomataceae, Mycenella variispora.*

The european *Mycenella* are not numerous and only two among them show smooth spores: *Mycenella salicina* and *Mycenella margaritifera*. After setting aside this latter species for the very small size of the fruitbody (Moreno & García-Manjón, 1979), it is necessary to take into account *M. salicina* and make a comparison with this species and the other non-european species with similar spores. *Mycenella variispora* differs from *M. salicina* and the other species with smooth spores for the macroscopic and microscopic features.

Dr. R. A. Maas Geesteranus, who I addressed to hear his eminent opinion and who I heartily thank, dispelled my doubts about a deviating form of *Mycenella salicina* and also excluded that my species could be put near *Mycenella favreana*, since the latter (on the ground of observations made with the same spore-print) showed nodulose and angular spores.

Mycenella variispora Robich *spec. nov.* Figs. 1-2.

Original Diagnosis: *Pileus* 10-30 mm *latus, hemisphaericus, ampla papilla praeditus vel umbonatus, hygrophanus, glabrescens, brunneoniger, brunneus fuliginosus, griseobrunneus, tenuiter sulcatus, iove iudo striis brunneonigris pellucide designatus. Lamellae* 24-34 (1L = 1-3-5 lam.) *ventricosae, adnatae vel parvo dente decurrentes atque eaedem distantes,* *albae, griseae, acie alba. Caro alba, odore farinaceo, sapore nullo vel subamaro. Stipes* 25-50 mm *altus,* 1,5-4 mm *crassus, fistulosus, aequalis, pruinosus, aquosus, griseus hyalinus, griseus aquosus, deorsum griseobrunneus, basi alba lanugine et radice* 2 cm *longa praedita.*

Sporae 4,4-6,5 (7) x 5-7,5 µm *(sine capitulo), subangulares et subpolygoniae, globosae et subglobosae, gibbosae et laeves, non amyloideae. Basidia tetrasporica, clavaeformia,* 6,5-8,5 x 30-38 µm. *Cheilocystidia* 9-14 x 55-95 µm, *laevia, fusiformia, lageniformia, tenui parete. Pleurocystidia* 12-17 x 45-85 µm, *frequentia, cheilocystidiis similia. Epicutis cellulis globiformibus et cellulis irregularibus magnis tumoribus praeditis, in gelatino contextu submersis, atque pileocystidiis flexuosis,* 4-9 x 35-50 µm, *constituta. Hyphae stipitis corticis* 2-3,5 µm *latae, caulocystidiis subfusiformibus, flexuosis, lageniformibus,* 4-11 x 45-85 µm, *praeditae. Fibulae in stipitis exterioribus hyphis, in aliquorum pileocystidiorum basi et in pilei tramae hyphis detectae.*

Habitat: gregaria aut duobus tribusve speciminibus fasciculata, ad terram cum Cisto salvifolio et Cisto monspeliensi consociata.

Holotypus MCVE 595, *Isotypus* MCVE 595/A, 595/B, 595/C, 595/D. *Leg. G. Robich,* 6. XI. 1996. Cipresseta di S. Agnese, Poggibonsi (SI), I.

Verbi origo: ex sporis versiformibus in ipso carpophoro.

Exssiccata: MCVE 595, 595/A, 595/B, 595/C, 595/D, duplo *in* AH 19543. *Leg.* G. Robich, 6. XI. 1996. Cipresseta di S. Agnese, Poggibonsi (SI).

Cap: 10-30 mm across, hemispherical, cone- or bell-shaped, flat, also with the margin slightly revolute, with a large papilla or umbonate, hygrophanous, shining, glabrescent, firstly blackish brown, dark brown, smoky brown, at the centre black, then brownish grey, pale grey, at the centre dark brown or blackish brown; margin paler, grey, translucent-striate with black or blackish brown streaks in damp weather, slightly sulcate in dry weather. Gills: 24-34 with intermediate gills (1 L = 1-3-5 l), not crowded, wide, ventricose (4-5 mm), someones intervenose, ascending, adnate or decurrent with a short tooth, distant in some specimens, white when young then greyish white and grey with a white edge. Flesh: white, blackish brown, aqueous under the cap cuticle, aqueous in the stem. Smell mealy, taste none or very slightly bitter. Stem: 1,5-4 x 25-50 mm, fistulose, equal, somewhat widening upwards, shining, pruinose, with a white pruine for the whole length, compressed, elastic, brittle, rather tough, straight, curved, also somewhat flexuose, white and hyaline upwards, then aqueous; hyaline grey, grey, aqueous or brownish grey downwards, with the base covered with whitish hairs, rooting for about 20 mm, with a big root. Habitat: isolated, gregarious or fasciculate in two or three specimens, on the ground, on the bare soil or among moss, in mixed woods (*Cupressus sempervirens, Quercus sp., Arbutus unedo*), constantly associated to *Cistus salvifolius* and *Cistus monspeliensis*.

Spores (A) 4,5-6,5(7) x 5-7,5 µm, (apart the button), subangular and subpolygonal, globose and subglobose, with or without excrescences, with a very large hilar appendage, mostly with a large drop, non-amyloid; spore-print white. Basidia 6,5-8,5 x 30-38 µm, 4-spored, club-shaped, with sterigmata variously long within the same basidium (4,5-7,5 µm). Cheilocystidia (B) 9-14 x 55-95 µm, smooth, fusiform, somewhat ventricose, thin-walled, with a more or less stretched peduncle and a lageniform upper prolongation, flexuose, rarely forked, with a dense dull content, numerous. Pleurocystidia 12-17 x 45-85 µm, frequent, similar to cheilocystidia. Pileipellis (C) formed by irregular cells with large excrescences and by globose cells, with an intracellular dull pigment, embedded in a gelatinous matter and by numerous flexuose pileocystidia, somewhat thickened at the base, 4-9 x 35-50 µm. Hyphae of the cap context cylindraceous, branched, anastomosing, 4-20 µm wide. Subhymenial layer formed by both subglobose and cylindraceous hyphae, 2,5-3,5 x 3,5-8 µm. Stipitipellis formed of the hyphae cylindraceous, not pseudoamyloid, internal wide up to 13 µm; external x 2-3,5 µm, smooth, metachromatic in violet, provided with a dull intracellular pigment, ending with curved, flexuose, subfusiform, lageniform, thin-walled elements (D), either as hyphal terminal cells or emerging from these, 4-11 x 45-85 µm. Hyphae of the cap context and of gills very slightly pseudoamyloid. Clamp-connections present

Observations: With reference only to the macroscopic features it cannot be denied that the species described above bears some resemblance to *Mycenella salicina* (Velenovsky) Singer, for the shape and the colours of the cap, the ripe gills grey, the stem fistulose, finely pruinose-velvety, with a white pruine. The only difference would be the habitat on bare soil or with moss and not on trunks of *Salix*, as described by Velenovsky but this latter does not represent an exclusive feature because *M. salicina* has also been collected on coastal dunes, in forests of *Picea* and *Pinus*, under *Pinus halepensis*, on the soil with *Salix reticulata* and *Dryas* at 2.300 mt. from sea level. Moreover, the spores of *Mycena salicina*, appear devoid of excrescences, i.e., smooth in the Velenovsky's Table (1920, Obr. 52, fig. 7). Some other Authors mention this character: "Spores sphériques ou subglobuleuses, lisses" (Kühner, 1938: 620); "Spores globose smooth" (Pearson, 1952: 101. - Dr. R. Kühner, who kindly determined it); "Spores lisses subglobuleuses" (Malençon & Bertault, 1975 (2): 633); "Spores broadly ellipsoid to subglobose, minutely angular in outline" (Gulden &

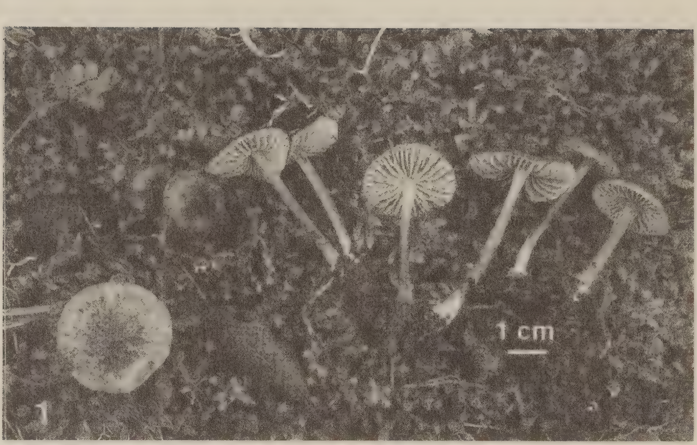

FIG.1 *Mycenella variispora* Robich, **HOLOTYPE**. Basidiocarps.

Jenssen, 1982: 187); "Spores globose, subglobose or broadly ellipsoid, sometimes somewhat angular" (Boekhout, 1985: 428); "Spores subglobuleuses non gibbeuses" (Kühner, 1989: 332).

The spores of *Mycenella variispora* are much variable: either subangular and subpolygonal without or with one or more excrescences, or, but in a less extent, subglobose, globose and smooth. Five collections, for a total amount of about 50 specimens, all of which with the variously shaped spores as reported above, have been made in the same finding locality, in places very distant from each other.

Mycenella eriopus (Sacc. & Sydow) Singer differs from the species here described for the cap size (6-12 mm), the fuscous reddish colour of the stem and the thick-walled cheilo- and pleurocystidia.

Mycenella favreana Horak has a dark grey, blackish grey, or black cap; whitish, grey or brownish grey gills; a brownish grey or dark grey, entirely pruinose and pubescent stem. All these characters resemble those of the species here described. The globose spores are recovered by warts and show four or six excrescences in their outline, but this character does not seem to be constant. The spores of *M. favreana* can also present a lesser number of excrescences (even only one); sometimes these excrescences are very low and in this case the spore can appear as obtusely angular.
Moreover, in the same spore-print both nodulose and angular spores have been observed (Kühner, 1989: 339).

Mycenella funebris Singer has 6 mm wide gills; odourless flesh; olive grey or sale olive stem; globose, smooth, very large spores, 9-10,2 µm; thick -walled, ventricose cheylocistidia with a rounded obtuse apex and thick-walled pleurocystidia.

Mycenella incommiscibilis (Berk.) Maas G. is described with a palely patched reddish brown cap, 10-11 mm across; tawny gills; stem base with yellow fibrils; globose, smooth spores and thick-walled cheilocystidia.

Mycenella radicata (Thiers) Maas G. differs for the lesser size (8-10 mm) of the cap; the odourless flesh; the hyaline white stem; the globose, smooth spores; the thick-walled cheilo- and pleurocystidia.

Mycenella subtropicalis Singer has a smaller cap, 14 mm; odourless flesh; globose and smooth spores and thick-walled cheilocystidia. This latter species has been put in the genus *Mycena*, section *Aciculae,* subsection *Omphaliariae* (Singer, 1986: 414).

Key of the *Mycenella* with smooth spores

1. Spores smooth.
  2. Cap 5-30 mm across, stem 10-60 mm long.
    3. Gills white or pale grey.
      4. Cap 8-10 mm across, gills white, basidia 2-spored. ***M. radicata***
      4. Cap larger than 19-30 mm, gills pale grey, basidia 4-spored. ***M. funebris***
    3. Gills tawny. ***M. incommiscibilis***
  2. Cap 2 mm across, stem 1,5 mm long. ***M. margaritifera***
1. Spores smooth and subangular.
  5. Spores smooth, gibbose and subangular in the same specimen.
      6. Flesh odourless, taste not mealy, cheilocystidia both thin and thick-walled. ***M. salicina***
      6. Flesh (probably) odourless, cheilocystidia thin-walled. ***M. eriopus***
  5. Spores smooth, gibbose and subangular, flesh with smell mealy and taste bitter, cheilocystidia thin-walled ***M. variispora***

The mealy smell and the slightly bitter taste of the flesh; the gills as numerous as 24-34; the stem hyaline upwards, aqueous downwards and with mixed grey and brown tints; the spores variously shaped, globose, subglobose, polygonal, smooth or gibbose, contemporarily observed in the same fruitbody; the thin-walled cheilo-, pleuro- and caulocystidia, represent the differential characters of *Mycenella variispora* with respect to the other similar species and allow one to put it between *M. salicina* and *M. eriopus.*

In the following Table the main characters of *Mycenella salicina* and *M. favreana* are compared with those of *M. variispora*. Moreover some characters of *M. eriopus, M. funebris, M. incommiscibilis* and *M. radicata* are also reported.

	variispora	salicina	favreana
Cap	10-30 mm, blackish brown, dark brown, brownish grey, papillate, umbonate	5-25 mm, brown or dark brown , brownish grey, blackish brown, papillate, umbonate	6-15 mm, black or blackish grey, submastoid
Flesh	odour mealy, taste slightly bitter	odourless, taste not mealy	smell none or faintly aromatic
Gills	24-34, greyish white, grey	17-30, pale grey, grey, nearly white	8-12, whitish, grey or brownish grey
Stem	1,5-4 x 25-50 mm, hyaline grey, aqueous grey, brownish grey; base covered with a white bloom	0,7-2,5 x 10-60 mm, grey, brownish grey, hyaline brown; base covered with brown or white hairs	0,7-1,5 x 10-20 mm, greyish or whitish, brownish grey or dark brown; base covered with white hairs
Spores	4,5-6,5(7) x 5-7,5 µm, globose, subpolygonal, with excrescences or smooth	4,1-5,6 x 5-6,7 µm, globose, subglobose, smooth, sometimes angular or obtusely angular	5-6,5 x 5,7-7,5 µm, globose with low excrescences, obtusely angular
Cheilocystidia	9-14 x 55-95 µm, spindle-shaped, lageniform, thin-walled	6-16 x 43-80 µm, ventricose, lageniform, both thin- and thick-walled (also limitedly to the central part)	7-15 x 50-110 µm, spindle-shaped-ventricose or enflated, thick-walled
Pleurocystidia	12-17 x 45-85 µm, similar to cheilocystidia, thin-walled	similar to cheilocystidia	similar to cheilocystidia
Pileocystidia	4-9 x 35-50 µm, flexuose	2-5 x 20-42 µm, cylindraceous, not ventricose downwards	3-5 x 25-135 µm
Caulocystidia	4-11 x 45-85 µm, subfusiform, lageniform, thin-walled	3-10 x 50-120 µm, subcylindraceous	thick-walled
Habitat	isolated, gregarious, caespitose	isolated or caespitose	

eriopus	**funebris**	**incommiscibilis**	**radicata**
6-12 mm, smoky, fuscous black	19-30 mm, pale grey, with brown fibrils, papillate-obtuse	10-11 mm, reddish brown, with pale patches and dark centre, umbonate	8-10 mm,blackish brown, then paler
	none		none
white	pale grey, 6 mm wide	tawny	22, white
pale, fuscous reddish	4-6,5(8) x 38-70 mm, pale grey, sale olive, dark brown; base covered with a white bloom	1-1,5 x 80 mm, tawny, nearly fulvous, darker downwards; base covered with yellow fibrils	8-10 x 25-30 mm, hyaline white
4,8-6 x 6-6,8 µm, globose, subangular	9-9,5 x 8,5-10,2 µm, globose and subglobose, completely smooth	6-6,3 x 7-8,5 µm, globose, smooth	5,8-7,3 x 8,2-8,8 µm, globose, subglobose, smooth
12,3-16,5 x 50-60 µm, ventricose, spindle-shaped, enflated, metuloid, thick-walled	6,7-22 x 55-165 µm, ventricose with a rounded obtuse apex, thick-walled	10-15 x 70-80 µm, spindle-shaped, lageniform, with a wall about 3 µm thick	7-10 x 22-42 µm, nearly spindle-shaped, cylindraceous, ventricose, thick-walled
	similar to cheilocystidia	similar to cheilocystidia	6,5-13,5 x 35-82 µm, similar to cheilocystidia
	9-10 x 30-40 µm		wide up to 8 µm
5-9 x 40-50 µm, similar to cheilocystidia, thick-walled		9-11 x 35-95 µm, thin-walled	6,5-9 x 22-27 µm, geniculate, curved outwards
	single or in small groups		gregarious, in the humus

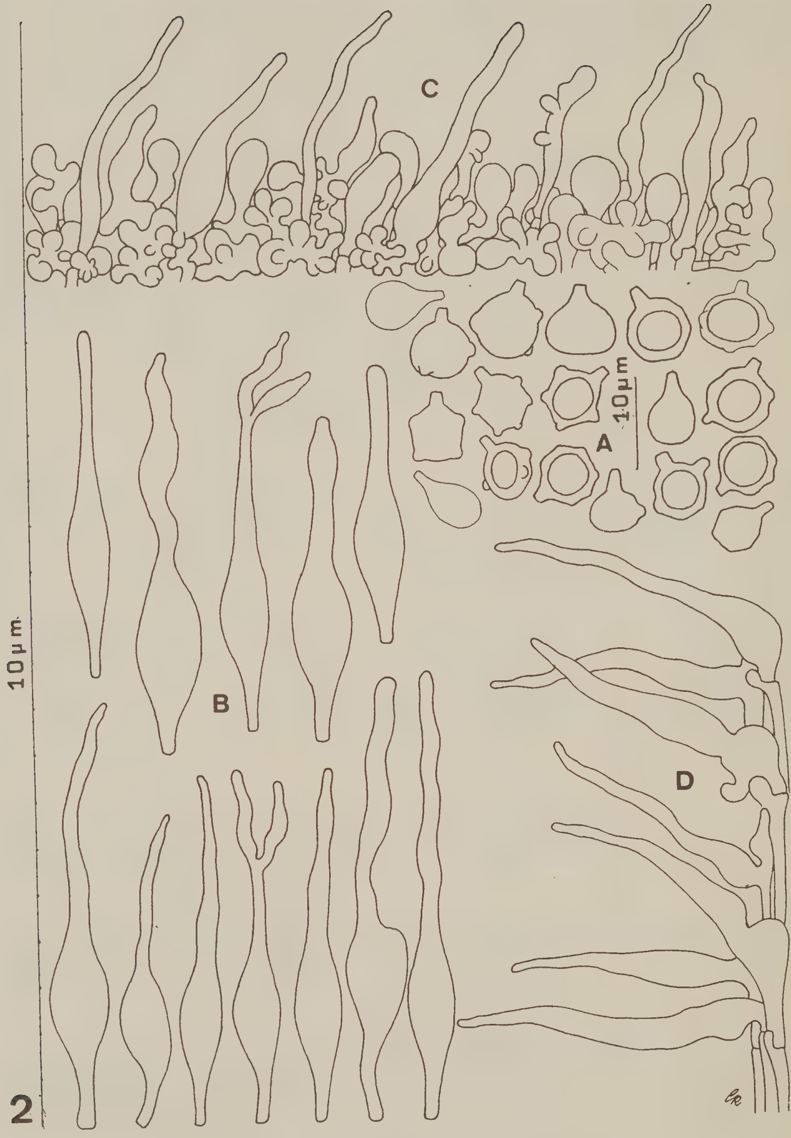
C
10 µm
A
10 µm
B
D
2

FIG.2 *Mycenella variispora* Robich, **HOLOTYPE**. A: Spores. B: Cheilocystidia. C: Pileipellis. D: Stipitipellis.

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CURTIS GATES LLOYD FROM THE PERSPECTIVE OF THE SOUTHERN AFRICAN GANODERMATALES (BASIDIOMYCOTA)

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ABSTRACT

A recent study of the scientific contributions of C.G. Lloyd (1859—1926) demonstrated that he had a controversial but broad impact on mycology. We have focused on specific areas of his legacy as part of the groundwork for a review of southern African Ganodermatales. Lloyd noted 16 species from this region, embodying some 13 taxa; two of the seven he described as new are still accepted. His determinations must be interpreted within his Friesian system, into which he tried to integrate spore characters without compromising his stated beliefs. Lloyd grasped the basic ganodermoid basidiospore structure, and recognised it as taxonomically significant, but he emphasised features of the basidioma as generic descriptors. We reflect this in a synoptic key to his ganodermoid groups. Among the published opinions that we encountered is that few of Lloyd's polypore taxa are still accepted, and that he negatively influenced polypore taxonomy by mocking innovation. Nonetheless, his approach was calculated, sequential and pragmatic. We support the view that his efforts are of continuing significance.

KEYWORDS: *Amauroderma*, *Ganoderma*, Ganodermataceae, Haddowiaceae, N.J. McGinty, review

INTRODUCTION

The maverick mycologist Curtis Gates Lloyd (1859—1926) held strong opinions on biosystematics and its practitioners. He voiced his impassioned views so candidly that his 'vigorous English' (Lloyd 1907a) still startles and his publications easily belie their principles. Nonetheless, Blackwell and Powell (1996) have provided a much needed overview of Lloyd's scientific legacy. Emerging on the seventieth anniversary of his death, it coincided with our appraisal of his ideas on ganodermoid fungi. This ensued from identifications that Lloyd did for P.A. van der Bijl (1916, 1917, 1922), an early cataloguer of southern African polypores (Baxter 1994, Baxter & Eicker 1995). We examined Lloyd's taxonomic and nomenclatural protocols as part of the groundwork for reviewing the Ganodermatales of this region. Here we present our findings, expand on some aspects covered by Blackwell and Powell (1996), and add opinions noted during a concomitant literature survey.

COMMENTARY

Nomenclature, names, typification and types

Lloyd is known for his derision of the rules of botanical nomenclature. Citing the authors of names was anathema to him, the ego-boosting cause of an 'exuberance' (Lloyd 1908a) of epithets and combinations (Lloyd 1899b, 1917). That E.M. Fries (1874) dispensed with this custom in 'his last and greatest work', further motivated Lloyd. Relentlessly he (Lloyd 1904a, 1917) pointed out its drawbacks, disputed the principles of priority (Lloyd 1905b) and typification (e.g. Lloyd 1909d, 1910a), and challenged their adherents (e.g. Lloyd 1920c). Lloyd poked fun at prioritists to the extreme of publishing satirical proposals in the name of N.J. McGinty (Lloyd 1906a). Some binomials, however, are probably to be taken seriously (Blackwell & Powell 1996).

His scorn was cunningly expressed in the McGinty persona. The professor was from Poseyville, 'posey' defining him as affected or pretentious (Thompson 1996). Further, through McGinty's '"co-workers"', Lloyd (1908b) coined a connection with W.A. Murrill — his compatriot — that pertains to polypore taxonomists. First Lloyd (1908b) apologised to McGinty for delaying publication of a new species and combination in *Polyporus* Fr. Then Lloyd (1908b) noted that, in the interim, McGinty's '"co-workers"' had found a '"new genus"' for these fungi: *Tyromyces* P. Karst. It was Murrill (1903) who had deemed the name usable, choosing a type species that is still upheld (Ryvarden 1991). The bogus delay also allowed Lloyd (1908c) to accuse Murrill of 'inventing a lot of useless "genera"', based on a review of his work by H. Sydow (1908). Finally, McGinty's initials clearly stand for 'Name Juggler' (e.g. Lloyd 1904a, 1908b), of whom Lloyd (1908c) rated Murrill 'not the first, but the worst'.

McGinty was one of the 'deluded individuals' who dig up 'corpses of discarded synonyms' (Lloyd 1914) — thus his fellowship of the Poseyville Fungus Forage Club (Lloyd 1908b)? The conclusive clue to his identity was that he was the brother-in-law of Mrs Gamp (Lloyd 1911c), and the brother of her friend, Mrs Harris (Lloyd 1914). That they are characters in *Martin Chuzzlewit* may be chance, although this Dickensian tale tells of selfishness, and the title character visits America, to Charles Dickens a country of greed and hypocrisy (Kaplan 1988). To Lloyd (e.g. 1924b) these traits typified nomenclaturists. What Harris is to Gamp, McGinty is to Lloyd, however: a make-believe friend, invoked to corroborate opinions.

This approach was too indirect. Although it satisfied Lloyd that some followers took McGinty seriously (Fitzpatrick 1927), he (Lloyd 1924b) resorted to marking paragraphs where he expressed ridicule. Lloyd (1924b) explained that he employed the oriental icon, Tso Kay, for this as it suggested the 'hypocrisy that symbolizes much of the work done in mycology'. The idea probably germinated some 19 years earlier. In an editorial note, W.A. Kellerman (1904) had thanked Lloyd for exposing inconsistencies 'practiced in the zeal to establish a stable nomenclature'. Kellerman (1904) concurred with Lloyd (1904c) that names could not be based on immature material, but doubted that the principle of priority could be 'dethroned'. Lloyd (1905b) retorted that he did not intend '*enthroning*' it 'as a little idol'.

Lloyd's nomenclatural views have not endured, and he published over 1000 new species names (Blackwell & Powell 1996). In fact, he was accused of being the 'biggest [personal] advertiser' of all — and admitted that it was true (Lloyd 1917). Lloyd did not use a different typeface or other means of distinguishing scientific names. This, too, may have reflected his contempt (e.g. Lloyd 1924c) for nomenclatural rules: his usage is retained in direct quotations.

Have his polypore taxa endured? To summarise details given by Ryvarden (1989, 1990, 1992), of 384 species described in 10 genera, some 13% are still accepted while 75% are regarded as synonyms; further, 2% of the types are missing, 5% have no spores and 5% either cannot be identified or their names have been designated as homonyms.

No polypore genera are credited to Lloyd but his *alter ego*, McGinty, cynically erected *Cyanosporus* (Lloyd 1909b) for *P. caesius* (Schrad.) Fr. — because of its blueish spore masses. McGinty also erected *Volvopolyporus* (Lloyd 1909b), for *V. peronatus* (Schulzer) McGinty, providing a diagnosis in 'pidgin Latin' (Lloyd 1907a) in mock deference to the rules of nomenclature. Ryvarden (1991) did not index *Cyanosporus* in his catalogue of polypore genera, and treated *Volvopolyporus* Lloyd ex Sacc. & Trotter (Hawksworth *et al.* 1995) as dubious.

Murrill has fared rather better: 18% of his 343 species are still accepted, with 78% regarded as synonyms (see Ryvarden 1985). Although Lloyd celebrated Murrill (Blackwell & Powell 1996), praising his abilities and personal qualities (Lloyd 1907b, 1915c, 1924c), he persistently (e.g. Lloyd 1906c, 1907b, 1915c, 1924c) charged him with 'name changing'. Ryvarden (1985) has shown that Murrill, like Lloyd, based many of his determinations on macromorphology but that it is Murrill's generic concepts that have been revived and acclaimed. Some 21 genera erected by Murrill have survived (Ryvarden 1991).

For most species that Lloyd recorded, he illustrated a 'type'. Blackwell and Powell (1996) aver that he regarded types as they are today. In fact, he followed his own convictions. Lloyd (1904b) did consider 'a "type" an authentic and true specimen of the species from the author by whom it was described', but he cautioned that 'We shall use the word "type" in a sense not always approved'. Firstly, he himself judged which specimen was the most 'true to the species'. Secondly, he assumed the right to reject a 'type' designated by the author of a taxon and, thirdly, he did so because he claimed that 'authors do not always know their own species'. He justified this by declaring that 'it is not any particular specimen but the species in which we are interested' (Lloyd 1904b). Later, Lloyd (e.g. 1910c) did note 'types' and 'cotypes', and stated that a type specimen 'is the identical specimen that was named and described and has no other meaning' (Lloyd 1923).

Mycological mockery, mentors and *modus operandi*

Quick to acknowledge his own errors (Blackwell & Powell 1996), Lloyd refused to 'whitewash' perceived blunders (e.g. Lloyd 1902c, 1906a, 1917) and invited critical analysis. He (Lloyd 1908c) believed that 'When mycologists begin to tell the truth about things in good plain English there is hope for the future', yet the only plain thing about this 'somewhat unconventional American mycologist' (Blackwell & Powell 1996) is that his legacy is slow to yield its truths. Although the study of Lloyd's privately published works is made easier by several indexes, it remains difficult (Blackwell & Powell 1996). Despite the obstacles, Blackwell and Powell (1996) appraised Lloyd's impact on modern systematics, justly concluding that he has had a substantial and continuing influence through his

- original descriptive contributions and photographs;
- biographical notes;
- international promotion of American mycological literature;
- reference collection and library, and his
- encouragement of many who might otherwise not have been involved in mycology.

Few mycologists escaped Lloyd's comments (e.g. Lloyd 1917). Whereas these tended to vary over time (Blackwell & Powell 1996), an unvarying target was C. Kalchbrenner, who named much of the earlier South African material (Lloyd 1920b, 1925). Lloyd (1920b) deemed this unfortunate as Kalchbrenner 'had about as much idea of fungus classification as he had of bacteria' and was a 'provincial amateur' (Lloyd 1925). Conversely, G. Bresadola was among the 'best authorities' (Lloyd 1902a), specifically on polypores (Lloyd 1911b, 1912b). Another of the admired few was N.T. Patouillard (Lloyd 1902a, 1905a), to whom Lloyd (1905a) was indebted for most of his expertise, and some new ideas (Lloyd 1912b) from his (Patouillard 1889) classification system. Even so, Lloyd (1904a) emulated E.M. Fries, who 'merely followed the lines laid down' by Persoon (Lloyd 1910b), the 'greatest genius who ever worked with mycology' (Lloyd 1912b, 1917).

Lloyd upheld Fries's concepts but was convinced that 'there are no hard and sharp lines' between genera (Lloyd 1908a). He (Lloyd 1909b) deemed mycology 'a study of variation'. Species delineation was a matter of individual conviction for which there could be no rules or definitions (Lloyd 1912b). Was it an autobiographical comment that individuals tended to become 'more liberal' with experience (Lloyd 1902b), thus finding fewer species (Lloyd 1909b, 1910a)? Whatever prompted this comment, Lloyd (1912b) came to regard fungal species as 'relatively few and widely distributed'. Indeed, his work is valuable because it treated taxa from a world-wide perspective (Fitzpatrick 1927). Also taking into account host plants or substrates, it thereby contributed to the foundation of modern mycogeographic thought (Blackwell & Powell 1996).

Conflicting opinions received from various authorities had fired Lloyd's (1906b, 1917) approach, causing him (Lloyd 1920c) to spend years 'hunting up the historical specimens preserved in the museums of Europe and acquiring a knowledge of their history and nomenclature'. As detailed by Blackwell and Powell (1996), Lloyd was also sent a multitude of specimens from all over the world (Lloyd 1920c), undertook a few collecting trips (e.g. Lloyd 1899c) and visited American collections (e.g. Lloyd 1903, 1925), so developing a keen appreciation of his place in the history of mycology.

Blackwell and Powell (1996) noted a 'somewhat formulated' transition in Lloyd's work, from agarics to Gasteromycetes, polypores and fleshy Ascomycetes. There is other evidence of a systematic strategy. Lloyd (1899b) dealt with one genus at a time, for instance, stressing (Lloyd 1904a, 1917) that familiarity with genera was a prerequisite for recognising new species. Further, recognising the difficulty of describing colour and the need for standard terms, Lloyd (1899a) followed *Prang's Standard of Colours*, later threatening to use a chrysanthemum lovers' set of named samples (Lloyd 1909b) but turning to Ridgway's standard (Lloyd 1915c) instead.

Regarding taxonomic characters, Lloyd believed in using but not overusing microscopic features (Blackwell & Powell 1996). At genus level, he (Lloyd 1904b) relied on macroscopic features of the mature fungus, despite recognising environmental effects on external appearance (Lloyd 1902b). He saw spore shape, size (Lloyd 1900) and colour (Lloyd 1915a) as useful at species level, and found microphotos frustrating because they did not show surface features (Lloyd 1904c). Lloyd (1900) warned against relying on spore dimensions because of their inherent variability, and the likelihood of human error. His own practice was to measure one spore that was 'perfect and of the largest size' (Lloyd 1915a, 1915c). Later, Lloyd (1915a) gained the insight to admit that those who judged species on general resemblances were often 'badly mistaken'.

Blackwell and Powell (1996) justifiably highlight Lloyd's use of photography. Lloyd fastidiously differentiated photographic negatives and prints (Lloyd 1898) from the 'photo-engraving processes' (Lloyd 1907a) used to reproduce photographs for publication, referring to products of these as photogravures (Lloyd 1898). It is a measure of his nature that he did not interchange the latter terms, as inferred by Blackwell and Powell (1996). Lloyd (e.g. 1898, 1901) advocated photographs for recording fungi, even proposing (Lloyd 1907a, 1922) a law to ensure satisfactory illustrations of new species. Few photographs appeared in mycological journals of the day: was it the American's plea to European mycologists to 'issue good photo-reproductions' (Lloyd 1901) that spurred L.L. Rolland in 1901 to use a photo to illustrate the type of his *Ganoderma lionetii*, in the *Bulletin de la Société mycologique de France* (1: 180, plate viii)? Or was it due to Lloyd's personal influence? He had joined the *Société* in 1900 (*op. cit.* 16: 8) — Rolland and Patouillard were founder members (*op. cit.* 1: v-ix, 1885).

Blackwell and Powell (1996) contested a report of Lloyd as an 'eccentric businessman', attributing this to Ryvarden (1989). Ryvarden (1989) did use this description, but six years before that, Hawksworth *et al.* (1983) had characterised Lloyd as 'a somewhat eccentric American businessman and amateur mycologist'. By most definitions Lloyd was eccentric. His heart, however, 'clearly was never in business affairs' (Blackwell & Powell 1996).

Whatever he was, the outspoken Lloyd was not modest. His photographs of agarics were the 'best illustrations of fungi' that he had seen (Lloyd 1898). They probably were: demand for prints soon exceeded supply (Lloyd 1898). Besides, Lloyd (1924a) boasted, on an international scale his collection contained 'probably ten times as many of the larger fungi as all other museums combined'(Lloyd 1920c). His (Lloyd 1925) report that a number of collectors working on South African fungi were 'getting good advise [sic] on it and are doing good work' was also a compliment to himself. South African mycologists for whom he named ganodermoid specimens included J. Medley Wood (e.g. Lloyd 1911a), I.B. Pole Evans (e.g. Lloyd 1912b, 1915e), A.V. Duthie (e.g. Lloyd 1912b, 1920b) and P.A. van der Bijl (e.g. Lloyd 1916, 1920a). Lloyd (1925) distinguished Van der Bijl by publishing his portrait.

It is interesting to note a comment from Lloyd (1904a) that provoked reaction from the South Africans. It involved Persoon, who was born in the Cape region. Lloyd (1904a) wrote of Persoon's mother that 'the biographer does not state distinctly, but we presume [she was] a native, hence Persoon must have been of mixed blood'. Len Verwoerd

(1924) — brother of H.F. Verwoerd, who later became a Prime Minister of the Republic of South Africa — responded that the lady was of the 'respected Dutch family' Groenewald, and that nothing could be found in the Cape Archives to support this contention.

Taxonomic tactics and the Ganodermatales

Ganodermoid fungi were the first representatives on which Lloyd exposed his taxonomic approach to polypores. He (Lloyd 1899b) initially followed Bresadola in recognising *Ganoderma* P. Karst., but questioned (Lloyd 1906b) whether *P. lucidus* Curtis: Fr. — typifying that genus with its shiny pileus and coloured spores — belonged in *Ganoderma*, *Polyporus* or *Fomes* (Fr.) Fr. Lloyd (1906b) deemed it 'better called Fomes', later (Lloyd 1907b) placing *F. roburneus* Fr. — a name now rejected (Donk 1974) — in 'section Ganoderma' of *Fomes*. Lloyd (1909c) finally decided that, as basidiomata of *P. lucidus* were persistent but did not revive, the species did not fit into *Fomes* after all.

Thus Lloyd framed tactics that led Donk (1969) to observe that the ganodermas 'were objects for haphazard determinations' to him. His decisions, however, must be seen from the perspective of his own taxonomic scheme. Lloyd (1911b) based his classification on that of Fries. Polypore genera in Lloyd's works that are pertinent to the present discussion are *Polystictus* Fr.: coriaceous annuals (Lloyd 1915c), fruit-bodies flexible when dry (1908a); *Polyporus*: fleshy annuals (Lloyd 1915c), brittle (Lloyd 1908a) not flexible (Lloyd 1912e) when dry; *Fomes*: perennials, hard and woody, tubes in strata (Lloyd 1910a, 1915a, 1915c) and, for resupinate forms, *Poria* Pers. (Lloyd 1915c).

Lloyd (1911b, 1912b) noted that these genera should be broken into 'natural sections', which themselves might come to be used as genera. Indeed, he (Lloyd 1912b, 1915a, 1915c) used some section names as primary elements in binomials (e.g. Lloyd 1915b). His use of the term 'section', however, can be confusing. Lloyd (1912b) initially designated his broad, named divisions of a genus, 'sections', but also applied the term to numbered subgroups within divisions. Although he (Lloyd 1915a) later titled the broad groups, 'general divisions' and their subdivisions, 'sections', in his text he continued to use 'section' for the former. Besides, some subgeneric 'sections' appeared to overlap 'genus' lines (Lloyd 1910d): section Microporus of *Polystictus*, for instance, ran 'through thicker forms' into *Polyporus* (Lloyd 1910d).

To subdivide the polypores, Lloyd (1911b) followed Fries in using stipe characters, listing five divisions (Lloyd 1912b). Lloyd (1912b) linked these to specific genera, except the stipitate forms — or 'species of the old genus' *Polyporus* — thus seemingly acknowledging their taxonomic heterogeneity. He (Lloyd 1912b) divided these into two groups: one with sub-woody fruit-bodies and another with fleshy or coriaceous fruit-bodies, together comprising 11 sections — 'or genera if one so desires to call them'. Two of these, for the ganodermoid forms, were taken from Patouillard, the other nine from Fries (Lloyd 1912b). Lloyd (1912b) separated them using features such as tube stratification, spore colour and shape, stipe insertion and colour, as well as context colour. He (Lloyd 1915c) noted later that he received more misnamed specimens subsequently than before, 'evidently from the use of this pamphlet'.

For the stipitate ganodermoid polypores, Lloyd (1905a) thus essentially followed Patouillard (1889), who had divided P.A. Karsten's (1881) genus *Ganoderma* into two. Although Lloyd (1912b) dismissed Karsten as the first of those who 'amused themselves by inventing new names', he (Lloyd 1912b) adopted these spore-based groups, in *Polyporus* rather than *Ganoderma*, and changed the gender of their names to match his parallel groups: Section Ganodermus and Section Amaurodermus. Within the non-stipitate ganodermoid forms of *Polyporus*, Lloyd (1915c) designated one General Division: 'Polyporus-Ganodermus'.

For 'perennial' ganodermoid fungi in the genus *Fomes*, Lloyd (1915a) erected General Division Ganodermus — its members lacking the shiny crust of Section Ganodermus of the stipitate polypores — as well as a group titled 'Stipitate Fomes of the Section Ganodermus'. Lloyd (1915a) noted that this should be the 'second section of stipitate polyporoids', thus revising his (Lloyd 1912b) previous opinion that there were no truly stipitate members of *Fomes*. Having framed a Section Ganodermus in both *Polyporus* (Lloyd 1912b) and *Fomes* (Lloyd 1915a), Lloyd (1915c) emphasised that 'annual Ganodermus-Polyporus forms are ... distinct species from the perennial Fomes forms'. He was adamant that *Ganoderma* was not a synonym of *Fomes*, 'although a few Fomes are Ganodermus' (Lloyd 1915a). This apparently puzzling remark may mark his grudging recognition of the ganodermoid fungi as a taxon. *Ganoderma* was the 'only one of Patouillard's polyporoid genera' that Bresadola recognised (Lloyd 1915a), so Lloyd probably thought that it must be so.

Lloyd (1915c) summarised his views by noting that the 'sections of Ganodermus are based on spore characters' (see Lloyd 1912b: 99), and that 'Ganodermus are readily subdivided into three sections': stipitate annuals (Lloyd 1912b), sessile *Fomes* (Lloyd 1915a) and sessile annuals (1915c). 'There is no section of Ganodermus in the genus Polystictus nor any resupinate species (Poria)', Lloyd (1915c) concluded, thereby reaffirming that he saw these genera as representing basidiomatal forms. Further, having stated that he would 'use the name Ganodermus gibbosus', Lloyd (1915b) designated other material 'Polyporus gibbosus', adding that 'the specimens I have are Polyporus, but it may be a Fomes when it gets older'. Lloyd (1924a) finally concluded that 'Fomes gibbosus ... is the name applied to the polymorphic Fomes applanatus when it takes a stipitate form ... It is not a species.'

We have set out in a synoptic key the features distinguishing these ganodermoid groups and subgroups, as far as possible ranking them in the sequence in which Lloyd (1911b, 1912b, 1915a, 1915c) employed them. Three sections, based on single species of which Lloyd was unsure, or unsure of their placing, are omitted: Section Ganodermus, '4. Anomalous section with a false stem' (Lloyd 1912b), based on a 'curious growth'; Section Amaurodermus 6 A, based on material with no 'normal' spores (Lloyd 1912b), and thirdly, 'Polyporus-Ganodermus' Section 104: 'Polyporus (Amaurodermus)', erected (Lloyd 1915c) for *F. dahlii* Henn. — Furtado (1981) pointed out that it was probably substipitate, not sessile.

Synoptic key: C.G. Lloyd's Sections for polypores with ganodermoid spores

Basidiomata perennial	1	2	3	4										
Basidiomata annual or persistent					5	6	7	8	9	10	11	12	13	14
Basidiomata stipitate			3					8	9	10	11	12	13	14
Basidiomata sessile	1	2		4	5	6	7	8						
Basidiomata hard: sub-woody or woody	1	2	3	4				8	9			12		
Basidiomata coriaceous or rigid, thin										10	11			
Basidiomata firm: context not spongy						6	7						13	14
Basidiomata soft: context spongy					5									
Basidiospores mostly truncate	1	2	3	4	5	6	7	8	9					
Basidiospores mostly not truncate										10	11	12	13	14
Context usually coloured	1	2	3	4		6	7	8	9	10	11	12	13	14
Context usually white or pale					5									
From tropical areas										10	11	12	13	14
From temperate and tropical areas	1	2	3	4	5	6	7	8	9					
Basidiospores 'rough'		2			5	6			9				13	14
Basidiospores 'smooth' or slightly 'rough'	1		3	4			7	8				12		
Basidiospores 'rarely found'										10	11			
Pileus not usually laccate	1	2	3	4						10	11	12	13	14
Pileus usually laccate					5	6	7	8	9					
Stipe usually velutinate										10	11	12		14
Stipe smooth but not laccate			3											
Stipe usually laccate								8	9				13	
Tubes notably thin walled: 60μm		2		4										
Tubes notably thick walled: 250μm	1													
Pores large: ca 1 mm diam.										10				
Pores large to small or minute									9			12	13	14
Pores small					5	6	7							
Pores minute		2		4										
Pores 'hardly visible'			3					8			11			
Gasterospores sometimes present	1				5							12		

EXPLANATION:

1 = Fomes Section 74: mostly *G. australe* (Fr.) Pat.; *G. sculpturatum* (Lloyd) Ryvarden also belongs here, judging from its original description (Lloyd 1912c);
2 = Fomes Section 73 B: *G. australe* and *Ganoderma* sp.;
3 = Section Ganodermus, stipitate Fomes Section 75: including *G. lucidum* s.l.;
4 = Fomes Section 73 A: including *G. applanatum* (Pers.) Pat., *G. australe*, *G. lobatum* (Schwein.) G.F. Atk. and *G. lucidum* (Curtis: Fr.) P. Karst.;
5 = Polyporus Section 102: *G. colossum* (Fr.) C.F. Baker;
6 = Polyporus Section 103 A: including *G. lucidum* s.l.;
7 = Polyporus Section 103 B: including *G. resinaceum* Boud.;
8 = Ganodermus Section 2: including *G. lucidum*, *G. lucidum* s.l., *G. capensis* (Lloyd) J.D. Zhao and *G. curtisii* (Berk.) Murrill;
9 = Ganodermus Section 3: including *Humphreya eminii* (Henn.) Steyaert and *G. lucidum* s.l.;
10 = Amaurodermus Section 7 A: *A. calcigenum* (Berk.) Torrend;
11 = Amaurodermus Section 7 B: mostly *A. exile* (Berk.) Torrend and *A. schomburgkii* (Mont. & Berk.) Torrend;
12 = Amaurodermus Section 5: including *A. rude* (Berk.) Torrend, *A. rugosum* (Blume & Nees: Fr.) Torrend and *A. preussii* (Henn.) Steyaert;
13 = Amaurodermus Section 6 B: including *Haddowia longipes* (Lév.) Steyaert;
14 = Amaurodermus Section 6 C: including *G. lucidum* s.l.

Lloyd's principal ganodermoid 'sections' or 'genera', are characterised as follows, and equated with their equivalent, modern genera.

Fomes: basidiomata mainly sessile, woody or sub-woody; perennial (i.e. with distinct or indistinct layers of tubes); context usually coloured: *Ganoderma*.

Ganodermus: mainly stipitate, sub-woody; annual, persistent or perennial; context usually coloured; pileus laccate; basidiospores with an apically projecting myxosporium that usually collapses to become truncate: mostly *Ganoderma* but including *Humphreya* Steyaert.

Polyporus: mainly sessile, firm to spongy; if thin, then brittle rather than flexible; annual (i.e. with one layer of tubes); context usually coloured but sometimes pale: *Ganoderma*.

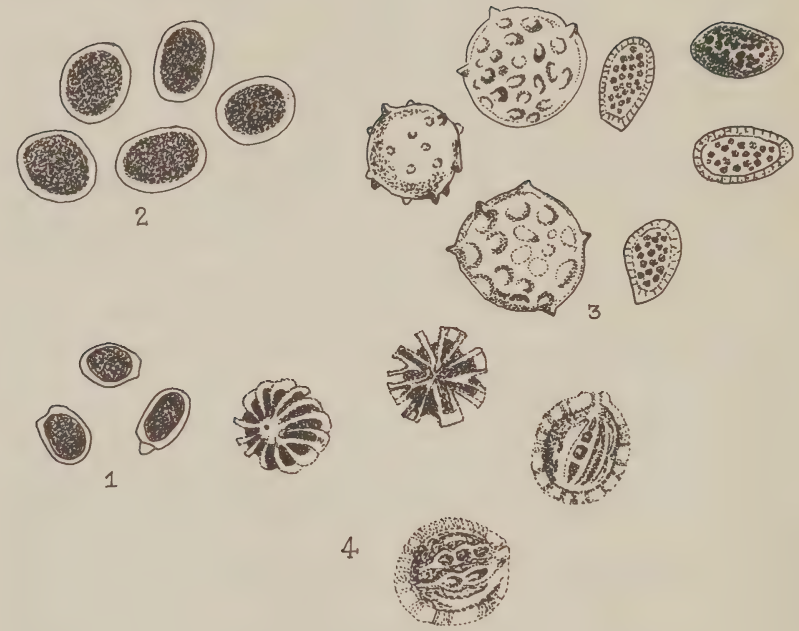
Amaurodermus: stipitate; if thin, coriaceous or rigid; annual; context usually coloured; pileus dull; basidiospores with a uniform myxosporium that does not become truncate: mostly *Amauroderma* Murrill but including *Haddowia* Steyaert.

The ganodermoid basidiospore

Early on in his mycological work, Lloyd (1899b) referred to the peculiarity of ganodermoid spores. Besides, by using features such as 'rough' and 'smooth' to distinguish between species, Lloyd (1901) acknowledged the taxonomic significance of their variations. Through McGinty, however, he (Lloyd 1909b) mocked mycologists who based new genera on spore features.

Later, Lloyd (1909a) pointed out a difference of opinion on ganodermoid basidiospores. Whereas Patouillard (Lloyd 1909a) informed him that those of *G. lucidum* were verrucose, G.F. Atkinson (1908) had found that their outer layer was smooth. Lloyd (1912b) adopted the correct interpretation, depicting members of his Section Ganodermus as having a hyaline 'epispore' and a coloured 'endospore' (Figures 1 & 2). In modern terms, the coloured and ornamented inner 'layer' constitutes the eusporium, and the hyaline outer 'layer', the myxosporium (Hawksworth *et al.* 1995).

Further, Lloyd (1912b) typified members of Section Amaurodermus as having a



FIGURES 1—4, illustrations of ganodermoid spores (redrawn from Lloyd): 1. Simplified structure of basidiospores of *Ganoderma* species showing the coloured eusporium and smooth myxosporium, which projects at one end where it typically collapses (from Lloyd 1912b). 2. Simplified structure of basidiospores of *Amauroderma* species, showing the uniform myxosporium (from Lloyd 1912b). 3. Gasterospores (left) and basidiospores (right) of *G. colossum* (Fr.) Baker (from Lloyd 1915c). 4. E.M. Wakefield's figure of the 'ribbed' basidiospores of *Polyporus costatus* Lloyd = *Haddowia longipes* (Lév.) Steyaert (Lloyd 1915d).

eusporium that 'filled' the myxosporium whereas in Ganodermus the myxosporium projected at one end, where it typically collapsed. This is the basic feature used to separate *Amauroderma* from *Ganoderma* (Ryvarden 1991). Lloyd (1912b) insisted, however, that it was the base that became truncate — until A.H.R. Buller (Lloyd 1924a) set him right. He also persisted in describing spores with a coarsely ornamented eusporium as 'rough' (e.g. Lloyd 1901, 1912b, 1915c), despite Atkinson (1908) pointing out that this interpretation — adopted by Patouillard and followed by Bresadola and others — was incorrect.

Lloyd (1912b) recognised the basidiospores of *P. longipes* Lév. as unique, their ornamentation forming narrow, wing-like bands (Lloyd 1920a). Later Lloyd (1915d) described *P. costatus* Lloyd as having spores with interconnected 'ribs', giving a figure of these by E.M. Wakefield (Figure 4). He used this twice again, first correctly captioned (Lloyd 1919), but also for *P. longipes* (Lloyd 1920a). These taxa are now regarded as conspecific (Ryvarden 1991). The only other species that Lloyd knew with spores similar to these, was *P. lloydii* Pat. & Har. (Lloyd 1915d). Lloyd (1912b) had described its spores as being uniquely reticulate, an observation matching that of Patouillard and Hariot (1912) and confirmed by Ryvarden and Johansen (1980). Today, *P. longipes* is seen as the type species of *Haddowia*, and *P. lloydii* as the type of *Humphreya* (Ryvarden 1991).

Like Patouillard (1889), Lloyd (1915c) observed that some ganodermoid specimens, such as *P. colossus* Fr., had in their context 'conidial spores' (Figure 3) — gasterospores or gasteroconidia (Hawksworth *et al.* 1995). Lloyd (1912c) erected *F. sculpturatus* on the grounds of its peculiarly ornamented gasterospores: the species is still recognised, in *Ganoderma* (Ryvarden 1989). Lloyd (1915a) speculated that these spores occurred more often than supposed, later (Lloyd 1922) noting them in *P. salebrosus* Lloyd.

Southern African records

The path of Lloyd's taxonomic views on ganodermoid fungi is evidenced in his notes on southern African material. First Lloyd (1911a) described 'Polyporus (Ganoderma) Africanus' from Natal, then he (Lloyd 1912a) noted 'Fomes (Ganodermus) australis' from the Cape and recorded (Lloyd 1914) 'Ganoderma (probably leucophaeus ...)'. Lloyd (1913b) protested that the 'sorting of these exotic forms of Fomes applanatus is a most puzzling problem', regarding *P. reniformis* Morgan as 'the annual form' of this species (Lloyd 1914). Further, having reported *P. curtisii* Berk. (Lloyd 1915e), Lloyd (1922) deemed a later specimen a 'Fomes form': *F. curtisii*, 'one of the species forms of *P. lucidus*'.

As compiled by Doidge (1950), Reid (1975) and Ryvarden (1989, 1990), Lloyd noted 16 names of ganodermoid fungi from this region (Table 1), of which seven were for pecies described as new. Two of the latter are accepted at present: *G. capensis* (Lloyd) J.D. Zhao and *G. nigrolucidum* (Lloyd) D.A. Reid, and the 16 names may represent up to 13 taxa (see Reid 1975; Ryvarden 1989, 1990, 1991; Zhao 1989). Lloyd (see Table 1) placed two of the listed species in groups other than those accommodating ganodermoid fungi: these sections are not included our key. The discordant placings were based on fungi assumed to have uncoloured (Lloyd 1920a) or pale (Lloyd 1912b) basidiospores.

Table 1. Ganodermatales: Taxa recorded by C.G. Lloyd for Southern Africa.

Present genus disposition *fide* Ryvarden (1991): those marked *, *fide* Reid (1975), and +, from Zhao (1989); epithet as in Reference	Genus: Section, as in Reference	Reference: Lloyd
Amauroderma		
arenosobasus Lloyd	Polyporus: Ovinus	1920a
salebrosus Lloyd	Polyporus: Amaurodermus	1912e
zambesianus Lloyd	Polyporus: Lignosus	1912b
Ganoderma		
africanus Lloyd *	Polyporus: Ganodermus	1911a, 1912b
annularis Lloyd	Fomes: Ganodermus	1912d
applanatus (Pers.) Pat.	Fomes: Ganodermus	1913b, 1915e
australis Fr.	Fomes: Ganodermus	1912a
capensis Lloyd *	Polyporus: Ganodermus	1916
colossus Fr.	Polyporus: Ganodermus	1915e
curtisii Berk.	Polyporus: Ganodermus	1915e
leucophaeus Mont.	Fomes: Ganodermus	1914
lucidus Curt.: Fr.	Polyporus: Ganodermus	1915e
nigrolucidus Lloyd	Polyporus: Ganodermus	1920a
oerstedii Fr.	Polyporus: Ganodermus	1913a
reniformis Morgan	Polyporus: Ganodermus	1914
resinaceus (Boud.) Rolland +	Polyporus: Ganodermus	1915e

Conclusions

Furtado (1981) felt that Lloyd helped to promote the establishment of Murrill's genus, *Amauroderma*. In the opinion of Donk (1971a, 1971b), however, Lloyd's effect on mycological taxonomy was negative, particularly in the higher basidiomycetes. For instance, by ridiculing Patouillard — who tried to free fungus taxonomy from the Friesian tradition — Lloyd contributed to Patouillard's system initially being ignored by North American mycologists (Donk 1971a). The 'terror' that Lloyd spread by deriding innovation in fungal systematics also contributed to a rift in taxonomic thinking between mycologists of Europe and North America (Donk 1971b). Among Americans, a tendency for 'splitters' such as Murrill to subdivide Friesian genera instead of developing better systems, ensued (Donk 1971a). Artificial genera thus proliferated, and increased the problem (Donk 1971b) by impeding acceptance of the European movement of taxonomic renewal (Donk 1971a).

Nonetheless, Lloyd decidedly underpinned the endeavours of pioneering mycologists in southern Africa and made significant contributions to their knowledge of ganodermoid polypores. It is imperative that his taxonomic decisions be evaluated within the context of his own era and scheme, however, besides being judged according to internationally accepted principles. The essence of these is captured in Article 5 of the Rules of the Poseyville Fungus Forage Club. '"When a new-species hunter is so careless in his work that he puts a plant in a genus where it has no possible relationships ..., owing to the poor quality of his work it becomes null and void and the plant shall be placed in the genus where it belongs ..."' (Lloyd 1908b). Our current investigations will elucidate the true standing of Lloyd's work on southern African Ganodermatales.

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ADDITIONAL NEW SPECIES AND TWO NEW REPORTS IN THE LICHEN GENUS *PERTUSARIA* (LICHENISED ASCOMYCOTINA) FROM PAPUA NEW GUINEA

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ABSTRACT: Nineteen new species in the lichen genus *Pertusaria* are described from Papua New Guinea. The new species are: *Pertusaria allogibberosa, P. angabangensis, P. aptrootii, P. atrospilota, P. balekensis, P. bogia, P. hypoprotocetrarica, P. inconspicua, P. karkarensis, P. laeana, P. manamensis, P. myola, P. naduriensis, P. novaeguineae, P. papuana, P. parmatica, P. perthwaitesii, P. sipmanii*, and *P. yupna. Pertusaria irregularis* Müll. Arg. and *P. petrophyes* C. Knight are reported for the first time from the same region. A revised key to the species of *Pertusaria* occurring in Papua New Guinea is given.

INTRODUCTION

Recent publications referring to the lichen genus *Pertusaria* in Papua New Guinea (Streimann & Sipman 1994, Aptroot *et al.* 1995, Archer *et al.* 1995, Elix *et al.* 1997) reported a total of 44 taxa from the region. An examination of additional specimens collected by A. Aptroot in 1995, H. Sipman in 1987 and 1992, and H. Streimann in 1992 has revealed the presence of 19 new species, which are described here. In addition the occurrence of *Pertusaria irregularis* Müll. Arg. and *Pertusaria petrophyes* C. Knight is recorded. The chemistry of the specimens was determined by thin-layer chromatography (Elix & Ernst-Russell 1993) and liquid chromatography (Feige *et al.* 1993).

NEW *PERTUSARIA* SPECIES

1. **Pertusaria allogibberosa** A.W. Archer & Elix, *sp. nov.* Figure 1

Sicut *Pertusaria gibberosa* Müll. Arg. sed ostiolis nigrioribus et 2,4,5-trichlorolichexanthone continens.

Type: PAPUA NEW GUINEA. MADANG PROVINCE: Manam Island, near Bogia. On trail E along dry stream *ca.* 500 m W of Dugulaba, 4°06′S, 145°01′E, alt. *ca.* 450 m; on canopy branches and trunk of felled tree ("gauma gauma") in clearing for garden, *H.J.M. Sipman 34914*, 22.vii.1992; holotype: B.

Thallus dull olive-green, somewhat cracked, corticolous, surface smooth and dull, lacking soredia and isidia. *Apothecia* verruciform, numerous, scattered, rarely confluent, flattened hemispherical, 0.6-1.0 mm diam. *Ostioles* conspicuous, black, punctiform, in a conspicuous translucent zone, 0.1-0.3 mm diam., 1 per verruca. *Ascospores* 8 per ascus, ellipsoid, smooth, 1-seriate, 55-65 µm long, 25-35 µm wide.

CHEMISTRY. K-, KC-, C-, Pd-; 4,5-dichlorolichexanthone (major), 2,4,5-trichlorolichexanthone (minor-trace) and 2′-*O*-methylperlatolic acid (major).

Pertusaria allogibberosa is characterised by apothecia with conspicuous black ostioles, asci with eight ascospores and the chemistry. The new species closely resembles *P. gibberosa* Müll. Arg. (Müller 1882a) both morphologically and chemically, but is distinguished from that species by the conspicuous black ostioles, the presence of 2,4,5-trichlorolichexanthone and the absence of 2-*O*-methylperlatolic acid. *Pertusaria gibberosa* is endemic to Australia and is restricted to the southern half of mainland Australia and Tasmania. The new species is known only from the type specimen.

2. **Pertusaria angabangensis** A.W. Archer & Elix, *sp. nov.* Fig. 2

Sicut *Pertusaria wauensis* A.W. Archer & Elix sed acidum sticticum, 4,5-dichlorolichexanthone et methyl barbatate continens et non acidum psoromicum.

Type: PAPUA NEW GUINEA. CENTRAL PROVINCE: Angabanga River 39 km ENE of Bereina, 8°36′S, 146°51′E, alt. 400 m, lowland forest on ridge with some remnant *Cycas*, on fallen tree branch, *H. Streimann 16186*, 14.ii.1981; holotype: CANB; isotypes: CANB, LAE.

Thallus pale fawn, thick, corticolous, surface smooth and shiny, lacking soredia, isidiate. *Isidia* simple, concolorous with the thallus, 0.1-0.2 mm tall, 0.05-0.1 mm diam. *Apothecia* unknown.

CHEMISTRY. K-, KC-, C-, Pd-; 4,5-dichlorolichexanthone (minor), methyl barbatate (major), methyl 3-α-hydroxybarbatate (trace), stictic acid (major), constictic acid (minor), peristictic acid (trace) and norstictic acid (trace).

Pertusaria anagbangensis is characterised by the sterile isidiate thallus and the presence of methyl barbatate with 4,5-dichlorolichexanthone and stictic acid. β-Orcinol depsides, such as barbatic acid, are characteristic of subgenus

Monomurata (Archer 1993) and this acid has been found in another sterile isidiate species, *P. barbatica* A.W. Archer & Elix, *nom. provis*. (Archer 1997) and in an unnamed fertile disciform species from New Zealand (*V. Wirth 27836*, STU). However, chlorinated lichexanthones, such as 4,5-dichlorolichexanthone, are absent from this subgenus and are considered to be characteristic of subgenus *Pertusaria*. If esters of β-orcinol depsides, such as methyl barbatate, are not excluded from subgenus *Pertusaria*, the presence of 4,5-dichlorolichexanthone places the new species in this subgenus. The discovery of fertile species with verruciform apothecia and methyl esters of β-orcinol depsides would confirm this classification. It should be noted that no trace of unesterified barbatic acid was detected.

3. **Pertusaria aptrootii** A.W. Archer & Elix, *sp. nov.* Fig. 3

Thallus hinnuleus, crassus, aerolatus et rimosus, superficies laevis et hebetata, isidiis et sorediis destitutus; saxicola. Apothecia verruciformia, numerosa, conspicua, raro confluentia, thallo concoloria, 1.0-1.5(-2.0) mm diam. Ostiola nigra, punctiformia, in verrucas 2-4na. Ascosporae 4nae, ellipsoideae, laeves, 108-125 µm longae, 37-48 µm latae.
Thallus 2-chlorolichexanthone et acida sticticum et 2-*O*-methylsuperlatolicum continens.

Type: PAPUA NEW GUINEA. CENTRAL PROVINCE: Varirata National Park, near Varirata Lookout, *ca*. 22 km E of Port Moresby, 9°26'S, 147°21'E, alt. 800 m, on conglomerate rock, *A. Aptroot 39609*, 23.x.1995; holotype: CANB; isotype: herb. Aptroot.

Thallus dull fawn, thick, areolate and cracked, saxicolous, surface subtuberculate and dull, lacking soredia and isidia. *Apothecia* verruciform, numerous, conspicuous, rarely confluent, concolorous with the thallus, flattened hemispherical, constricted at the base, slightly concave above, 1.0-1.5(-2.0) mm diam. *Ostioles* black, punctiform 2-4 per verruca. *Ascospores* 4 per ascus, ellipsoid, smooth, 108-125 µm long, 37-48 µm wide.

CHEMISTRY. K-, KC-, C-, Pd-; 2-chlorolichexanthone (minor), 2-*O*-methylsuperlatolic acid (major), 2-*O*-methylisohyperlatolic acid (minor), iso-hyperplanaic acid (minor), methyl planaiate (trace), stictic acid (major) and cryptostictic acid (trace).

Specimen examined:
PAPUA NEW GUINEA. type locality, *A. Aptroot 39617* (herb. Aptroot).

Pertusaria aptrootii is characterised by asci with four smooth-walled ascospores and the presence of 2-chlorolichexanthone, 2-*O*-methylsuperlatolic acid and stictic acid. Unlike some other nominally four-spored species of *Pertusaria* from Papua New Guinea, the asci contain only four ascospores; no asci with three or five ascospores were seen. The new species is known only from two specimens from the type locality and is named after the collector, Dr. A. Aptroot, who has collected extensively in Papua New Guinea and elsewhere.

4. **Pertusaria atrospilota** A.W. Archer & Elix, *sp. nov.* Fig. 4

Sicut *Pertusaria vulpina* A.W. Archer sed ascosporis minoribus.

Type: PAPUA NEW GUINEA. CENTRAL PROVINCE: Varirata National park, 33 km E of Port Moresby, 9°26′S, 147°21′E, alt. 800 m, *A. Aptroot 39564*, 23.x.1995; holotype: CANB.

Thallus pale greyish white, thick, saxicolous, surface subtuberculate and shiny, lacking soredia and isidia. *Apothecia* verruciform, conspicuous, often confluent, flattened hemispherical, 0.4-0.6 mm diam. *Ostioles* conspicuous, black, 0.1-0.2 mm diam., 1 per verruca. *Ascospores* 2 per ascus, ellipsoid, smooth, 95-115 µm long, 30-37 µm wide.

CHEMISTRY. K+ weak yellow, KC-, C-, Pd-; 4,5-dichlorolichexanthone (minor), stictic acid (major), constictic acid (minor), cryptostictic acid (trace) and norstictic acid (trace).

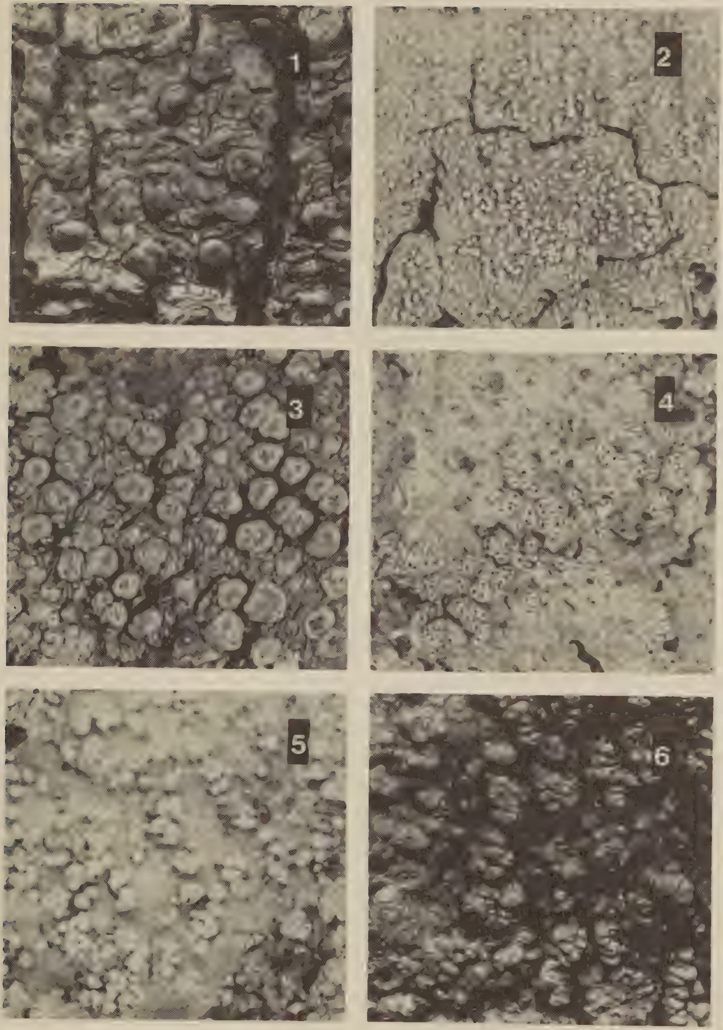
Specimen examined:
PAPUA NEW GUINEA. type locality, *A. Aptroot 39617* (herb. Aptroot).

Pertusaria atrospilota is characterised by the presence of 4,5-dichlorolichexanthone and stictic acid, and asci with two smooth-walled ascospores. It is distinguished from the chemically similar *P. vulpina* A.W. Archer (Archer 1991), which also occurs in Papua New Guinea, by the smaller ascospores. *Pertusaria vulpina* has asci with two ascospores, (120-)150-175 µm long.
The epithet "atrospilota", black spotted, refers to the numerous black ostioles present in the predominantly confluent apothecia. The new species is known only from two specimens from the same locality.

5. **Pertusaria balekensis** A.W. Archer & Elix, *sp. nov.* Fig. 5

Thallus hinnuleus, tenuis, superficies laevis et nitidae, sorediatis sed isidiis destitutis; corticola et saxicola. Soralia conspicua, numerosa, dispersa, thallo concoloria, 0.3-0.6 mm diam. Apothecia ignota.
Thallus 4,5-dichlorolichexanthone et acidum sticticum continens.

Type: PAPUA NEW GUINEA. MADANG PROVINCE: Balek Wildlife Sanctuary, *ca.* 15 km S of Madang along road to Lae, 5°18′S, 145°43′E, alt. *ca.* 20 m, on tree trunk in forest relics and primary forest, *A. Aptroot 36802*, 3.xi.1995; holotype: CANB; isotype: herb. Aptroot.



Figures 1-6. New *Pertusaria* species.

1. *P. allogibberosa* x5. 2. *P. anagabangensis* x3.5. 3. *P. aptrootii* x3.5. 4. *P. atrospilota* x3.5. 5. *P. balekensis*x3.5. 6. *P. bogia* x5.

Thallus yellowish-fawn, thin, corticolous and saxicolous, surface smooth and shiny, slightly cracked, sorediate, lacking isidia. *Soralia* conspicuous, numerous, scattered, concolorous with the thallus, 0.3-0.6 mm diam., sometimes slightly substipitate to 0.6 mm tall. *Apothecia* unknown.

CHEMISTRY: K-, KC-, C-, Pd-; 4,5-dichlorolichexanthone (minor), stictic acid (major), constictic acid (minor) with traces of substictic, peristictic and cryptostictic acids.

Specimens examined:
PAPUA NEW GUINEA. NORTHERN PROVINCE: Owen Stanley Range, Myola, along trail to Naduri, 9°S, 147°46′E. alt. 2100 m, on branches of fallen tree, *A. Aptroot 37852, 37905*, 17.x.1995 (herb. Aptroot). CENTRAL PROVINCE: Varirata National Park, *ca.* 22 km E of Port Moresby, 9°26′S, 147°21′E, alt. *ca.* 800 m, *A. Aptroot 39605*, 23.x.1995 (herb. Aptroot).

Pertusaria balekensis is characterised by the sorediate thallus and the presence of 4,5-dichlorolichexanthone and stictic acid. This chemistry distinguishes the new species from the other sorediate *Pertusaria* species that occur in Papua New Guinea (see Key). The new species is both corticolous and saxicolous and occurs from 20 m to 2100 m altitude. The epithet "balekensis" is derived from the type locality, the Balek Wildlife Sanctuary.

6. **Pertusaria bogia** A.W. Archer & Elix, *sp. nov.* Fig. 6

Sicut *Pertusaria cinchonae* Müll. Arg. sed acidum 2-*O*-methylconfluenticum continens et non acidum confluenticum, ascosporis parum majoribus et ostiolis nigris.

Type: PAPUA NEW GUINEA. MADANG PROVINCE: Mangrove Island in Boroi River, near Bogia, 4°05′S, 144°47′E, alt. 1 m, *H.J.M. Sipman 34898*, 21.vii.1992; holotype: B.

Thallus pale olive green, thin, corticolous, surface smooth and shiny, lacking soredia and isidia. *Apothecia* verruciform, numerous, often confluent, flattened hemispherical, concolorous with the thallus, 0.5-0.6 mm diam., confluent verrucae irregular in outline, up to 3 mm wide. *Ostioles* conspicuous, black, punctiform, 1 per verruca. *Ascospores* (3-)4 per ascus, ellipsoid, smooth, (85-)100-120(-125) µm long, 30-37 µm wide.

CHEMISTRY: K-, KC-, C-, Pd-; 4,5-dichlorolichexanthone (minor), 2-*O*-methylconfluentic acid (major), stictic acid (minor) and constictic acid (trace).

Specimens examined:
PAPAUA NEW GUINEA. CENTRAL PROVINCE; Varirata Plateau, 22 km E of Port Moresby, 9°27′S, 147°23′E, alt. 700 m, *H.J.M. Sipman 22335*, 19.iii.1987 (B).

MADANG PROVINCE: S side of Ramu Valley, 5°45′S, 145°20′E, alt. 100 m, *A. Aptroot 38534, 38539*, 29.x.1995 (herb. Aptroot).

Pertusaria bogia is characterised by small confluent apothecia, asci with four, or rarely three, ascospores and the presence of 2-*O*-methylconfluentic acid. The new species somewhat resembles *P. cinchonae* Müll. Arg., from India (Müller 1884), which also has 4 ascospores but contains confluentic acid in place of 2-*O*-methylconfluentic acid. The species is named after the village of Bogia, near the type locality.

7. **Pertusaria hypoprotocetrarica** A.W. Archer & Elix, *sp. nov.* Fig. 7

Sicut *Pertusaria wauensis* A.W. Archer & Elix sed acidum hypoprotocetraricum continens et non acidum psoromicum.

Type: PAPUA NEW GUINEA. MOROBE PROVINCE: Nauti Logging Area, Upper Watut River, 10 km SW of Bulolo, 7°16′S, 146°36′E, alt. 1300 m, on upper branches of *Calophyllum soulattri, H. Streimann 17166*, 3.ii.1892; holotype: CANB.

Thallus pale fawn, thin, cracked, corticolous, surface smooth and shiny, lacking soredia, isidiate. *Isidia* numerous, simple, concolorous with the thallus, 0.2-0.5 mm tall, 0.05-0.1 mm diam. *Apothecia* unknown.

CHEMISTRY. K-, KC-, C-, Pd-; hypoprotocetraric acid (major), conhypoprotocetraric acid (minor), nornotatic acid (trace) and pannarin (trace).

Pertusaria hypoprotocetrarica is characterised by the sterile isidiate thallus and the presence of hypoprotocetraric acid. The presence of this acid distinguishes the new species from other sterile isidiate species in Papua New Guinea and places this species in subgenus *Pertusaria* (Archer 1993). The new species is known only from the type specimen.

8. **Pertusaria inconspicua** A.W. Archer & Elix, *sp. nov.* Fig. 8

Sicut *Pertusaria nana* Müll. Arg. sed ascosporis 4nis in asci et 6-*O*-methylarthothelin continens et non acidum 2-*O*-methylperlatolicum et confluenticum.

Type: PAPUA NEW GUINEA. MADANG PROVINCE: Laing Island in Hansa Bay, 10 km W of Bogia, 4°10.4′S, 144°52.5′E, alt. 1 m, coastal primary forest, *A. Aptroot 38380*, 25-27.x.1995; holotype: CANB.

Thallus off-white, thin, cracked, surface subtuberculate and dull, lacking soredia and isidia. *Apothecia* verruciform, scattered, inconspicuous, concolorous with the thallus, very flattened-hemispherical, 0.6-0.8 mm diam. *Ostioles* conspicuous, black, 1 per verruca. *Ascospores* 4 per ascus, rarely 5 or 6, ellipsoid, smooth, (45-)50-62 µm long, 25-32 µm wide.

CHEMISTRY. K-, KC+ orange, C+ orange, Pd-; 6-*O*-methylarthothelin (major), arthothelin (minor), 2,4-dichloronorlichexanthone (trace), 2,5-dichloronorlichexanthone (trace) and 4,5-dichloronorlichexanthone (trace).

Pertusaria inconspicua is characterised by asci with predominantly four ascospores, rarely with five or six, and the presence of 6-*O*-methylarthothelin and arthothelin. No asci were seen with seven or eight ascospores. The inconspicuous apothecia and the small ascospores resemble those of *P. nana* Müll. Arg. described from Argentina (Müller 1889), but that species has asci with eight ascospores and contains 2'-O-methylperlatolic and confluentic acids. Other species chemically similar to *P. inconspicua*, *viz*. *P. howeana* A.W. Archer & Elix from Australia (Archer & Elix 1991), *P. idukkiensis* D.D. Awasthi & P. Srivastava from India (Awasthi & Srivastava 1993) and *P. papillulata* Nyl. [syn. *P. pustulata* var. *erythrina* Räsänen] from Chile (Nylander 1855), all have asci with eight ascospores.

9. **Pertusaria karkarensis** A.W. Archer & Elix, *sp. nov.* Fig. 9

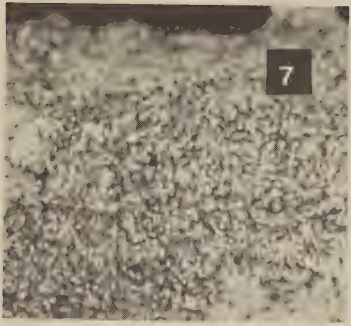
Thallus olivaceus, subrimosus, tenuis, superficies hebetata, isidiatus, sorediis destitutus; corticola. Apothecia verruciformia, isidiata, rara, dispersa, thallo concoloria (0.8-)1.2-2.0 mm diam. Ostiola inconspicua, hinnulea, in verrucas singulis. Ascosporae 8nae, biseriatae, ellipsoideae, laeves, (80-)85-95 µm longae, 30-35 µm latae.
Thallus acidum thiophanicum et arthothelin continens.

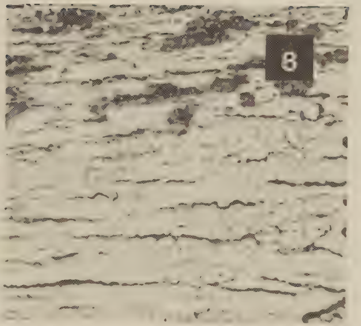
Type: PAPUA NEW GUINEA. MADANG PROVINCE, Karkar Island, NW side, S of airfield at Kinim Station, 4°35'S, 145°55'E, alt. 300 m, on trunks of *Cocos* in plantation, *H.J.M. Sipman 24217*, 28.ii.1987; holotype: B.

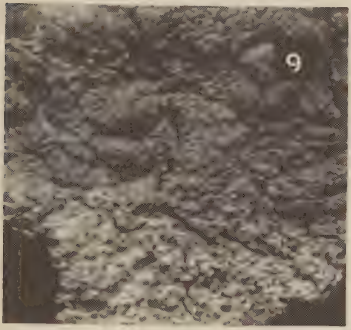
Thallus pale olive green, somewhat cracked, thin, corticolous, surface minutely subtuberculate and dull, lacking soredia, minutely isidiate. *Isidia* inconspicuous, simple, concolorous with the thallus, sparse, scattered, 0.05-0.1 mm tall, 0.05 mm diam. *Apothecia* verruciform, concolorous with the thallus, uncommon, scattered, flattened-hemispherical, minutely isidiate, (0.8-)1.2-2.0 mm diam. *Ostioles* inconspicuous, pale fawn, 1 per verruca. *Ascospores* 8 per ascus, ellipsoid, smooth, 2-seriate, (80-)85-95 µm long, 30-35 µm wide.

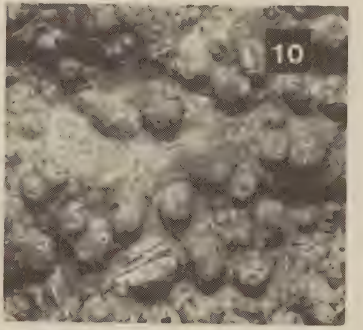
CHEMISTRY. K+ weak yellow, KC+ orange, C+ orange, Pd-; thiophanic acid (major), arthothelin (minor), asemone (minor) and 3-*O*-methylasemone (trace).

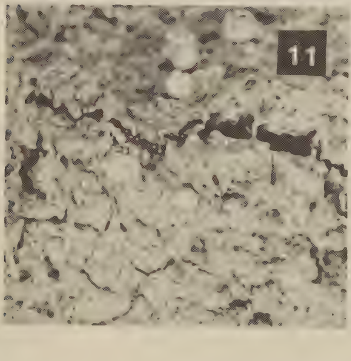
Pertusaria karkarensis is characterised by large apothecia, asci with eight

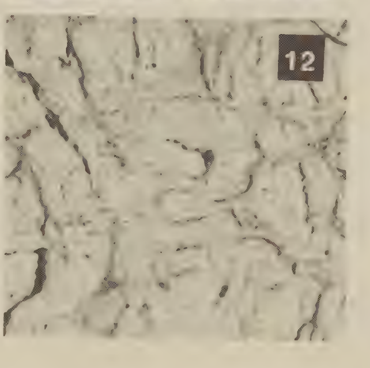












Figures 7-12. New *Pertusaria* species.

7. *P. hypoprotocetrarica* x3.5. 8. *P. inconspicua* x3.5. 9. *P. karkarensis* x5. 10. *P. manamensis* x5. 11. *P. myola* x3.5. 12. *P. naduriensis* x3.5.

biseriate ascospores and the presence of chlorinated norlichexanthones. The new species is chemically and morphologically similar to *P. thula* A.W. Archer (Archer 1991) but the latter species is saxicolous, lacks isidia and has smaller ascospores, 60-85 µm long. *Pertusaria karkarensis* also resembles *P. bartlettii* A.W. Archer & Elix (Archer & Elix 1994) but this species has smaller ascospores, immersed apothecia and large conspicuous black ostioles and lacks isidia. The epithet "karkarensis" refers to Karkar Island, off the NW coast of Papua New Guinea, the type locality.

10. **Pertusaria laeana** A.W. Archer & Elix, *sp. nov.*

Sicut *Pertusaria microstoma* Müll. Arg. sed acidum 2-*O*-methylperlatolicum continens et non acidum 2′-*O*-methylperlatolicum et ascosporis parietibus interioribus laevis et non undulatis.

Type: PAPUA NEW GUINEA. MOROBE PROVINCE: Lae, city centre, Coronation Drive, 6°45′S, 147°00′E, alt. 30 m, on trunk of street tree, *H.J.M. Sipman 24301*, 5.iii.1987; holotype: B.

Thallus olive green, thin, corticolous, surface somewhat cracked, smooth and dull, lacking soredia and isidia. *Apothecia* verruciform, numerous, scattered, rarely confluent, flattened-hemispherical, 0.6-1.0 mm diam. *Ostioles* inconspicuous, black, punctiform, sometimes sunken, 1 per verruca. *Ascospores* 4 per ascus, ellipsoid, smooth, 100-120 µm long, 30-40 µm wide.

CHEMISTRY. K-, KC-, C-, Pd-; 4,5-dichlorolichexanthone (major), 2-chlorolichexanthone (minor), 2-*O*-methylperlatolic acid (minor), stictic acid (major), cryptostictic acid (trace), peristictic acid (trace) and norstictic acid (trace).

Pertusaria laeana is characterised by asci with four ascospores and the presence of 4,5-dichlorolichexanthone, 2-*O*-methylperlatolic acid and stictic acid. The new species somewhat resembles *P. microstoma* Müll. Arg. (Müller 1882), both morphologically and chemically. However, *P. microstoma* has ascospores with rough walls and contains 2′-*O*-methyl perlatolic acid in contrast to *P. laeana* which contains 2-*O*-methylperlatolic acid and has ascospores with smooth walls. The new species is known only from the type specimen which is named after the city of Lae, the type locality.

11. **Pertusaria manamensis** A.W. Archer & Elix, *sp. nov.* Figure 10

Sicut *Pertusaria aptrootii* (*vide supra*) sed ascosporis minoribus et 2-chlorolichexanthone et acidum sticticum deficiens.

Type: PAPUA NEW GUINEA. MADANG PROVINCE: Manam Island, near Bogia, 4°07'S, 145°00'E, alt. 50 m, in gardens near Budua, *H.J.M. Sipman 34902*, 22.vii.1992; holotype: B.

Thallus olive green, corticolous, surface smooth and shiny, lacking soredia and isidia. *Apothecia* conspicuous, numerous, often confluent, concolorous with the thallus, flattened-hemispherical to subspherical, 0.5-0.8 mm diam., confluent verrucae 1.0-1.5 mm wide. *Ostioles* black, punctiform, 1 per verruca. *Ascospores* 3(-4) per ascus, ellipsoid, smooth, 80-100 µm long, 35-40 µm wide.

CHEMISTRY. K-, KC-, C-, Pd-; 2-*O*-methylsuperlatolic acid (major), isohyperplanaic acid (minor), superplanaic acid (trace), methyl planaiate (trace) ± 2-O-methylisohyperlatolic acid (minor).

Specimen examined:
PAPUA NEW GUINEA. MOROBE PROVINCE: Road 2, 3 km S of Bulolo, 7°13'S, 146°37'E, alt. 780 m, on *Cedrella* stem, *H. Streimann 41860*, 5.iii.1989 (CANB).

Pertusaria manamensis is characterised by the presence of 2-*O*-methylsuperlatolic acid and asci with three to four ascospores. The species somewhat resembles *P. aptrootii (vide supra)* as both species contain 2-*O*-methylsuperlatolic acid and have asci with four ascospores. However, *P. aptrootii* has larger ascospores and contains additional 2-chlorolichexanthone and stictic acid. The epithet "manamensis" is derived from the type locality, Manam Island.

12. **Pertusaria myola** A.W. Archer & Elix, *sp. nov.* Fig. 11

Sicut *Pertusaria patellifera* A.W. Archer sed lichexanthone continens et non atranorin et ascosporis majoribus.

Type: PAPUA NEW GUINEA. NORTHERN PROVINCE: Owen Stanley Range, Myola, *ca.* 2 km along trail NE from guesthouse, 9°08'S, 147°47'E, alt. 2400-2800 m, in primary montane forest dominated by *Phyllocladus* sp., on mountain ridge, *A. Aptroot 37613*, 16.x.1995; holotype: CANB; isotype: herb. Aptroot.

Thallus dull fawn, corticolous, surface smooth and dull, somewhat cracked, lacking soredia and isidia. *Apothecia* disciform, conspicuous, scattered, initially closed and subglobular, opening to form a concave disc with lacerated margins, 1.0-2.5 mm diam., surface of disc white pruinose. *Ascospores* 1 per ascus, ellipsoid, (160-)175-195 µm long, (45-)55-75 µm wide, ascospore wall 5-6 µm thick.

CHEMISTRY. K-, KC+ violet. C-, Pd-; lichexanthone (major) and picrolichenic acid (major).

Pertusaria myola is characterised by conspicuous disciform apothecia, asci with single ascospores and the presence of lichexanthone and picrolichenic acid. The species resembles *P. patellifera* A.W. Archer (Archer 1991) both morphologically and chemically, but that species contains atranorin in place of lichexanthone and the picrolichenic acid present is accompanied by its higher and lower homologues, in contrast to *P. myola* which contains picrolichenic acid alone. In addition, the ascospores in *P. patellifera* are smaller than those in *P. myola*, being 155-170 μm long. *Pertusaria myola* also resembles *P. yupna*, which occurs at similar altitudes in Papua New Guinea, but the latter species has smaller spores, 112-132 μm long, and contains thamnolic acid. The epithet "myola" refers to the village of Myola, near the type locality.

13. **Pertusaria naduriensis** A.W. Archer & Elix, *sp. nov.* Fig. 12

Thallus hinnuleus, subrimosus, superficies laevis et hebetata, isidiis et sorediis destitutus; corticola. Apothecia verruciformia, inconspicua, perplano-hemisphaerica, thallo concoloria, subconfluentia, 0.6-1.0 mm diam. Ostiola inconspicua, nigra, in verrucis singula. Ascosporae (3-)4(-5) nae, ellipsoideae, laeves, (65-)70-80(-85) μm longae, 30-35 μm latae.
Thallus acidum norsticticum continens.

Type: PAPUA NEW GUINEA. CENTRAL PROVINCE: Owen Stanley Range, surroundings of Naduri village, 9°08'S, 147°41'E, alt. 1600 m, secondary vegetation and gardens, *A. Aptroot 38144*, 19-20.x.1995; holotype: CANB.

Thallus pale fawn, corticolous, surface smooth and dull, slightly cracked, lacking soredia and isidia. *Apothecia* verruciform, concolorous with the thallus, inconspicuous, very flattened-hemispherical, slightly concave above, sometimes confluent and forming a continuous crust, individual apothecia 0.6-1.0 mm diam. *Ostioles* inconspicuous, black, 1 per verruca. *Ascospores* (3-)4(-5) per ascus, ellipsoid, smooth, (65-)70-80(-85) μm long, 30-35 μm wide.

CHEMISTRY. K+ red, KC+ red, C-, Pd+ yellow; norstictic acid (major) and connorstictic acid (trace).

Pertusaria naduriensis is characterised by asci with four ascospores (although some asci contained three or five ascospores) and the presence of norstictic acid. The four-spored asci distinguish the new species from the other *Pertusaria* species with norstictic acid which occur in Papua New Guinea (see Key).

14. **Pertusaria novaeguineae** A.W. Archer & Elix, *sp. nov.* Figure 13

Thallus olivaceus, superficies laevis et nitida, isidiis et sorediis destitutus;

corticola. Apothecia verruciformia, conspicua, numerosa, interdum confluentia, thallo concoloria, 1.0-1.5(-2.0) mm diam. Ostiola conspicua, nigra, punctiformia, in verrucas 2-5na. Ascosporae (3-)4nae, ellipsoideae, laeves, (115-)125-150 µm longae, 35-45 µm latae.
Thallus acida 2′-*O*-methylperlatolicum et sticticum continens.

Type: PAPUA NEW GUINEA. MADANG PROVINCE: Karkar Island, NW side S of the airfield at Kinim Station, 4°35′S, 145°35′E, alt. 300 m, on trunks of *Cocos* in plantation, *H.J.M. Sipman 24225*, 28.ii.1987; holotype: B.

Thallus pale olive green, corticolous, surface smooth and shiny, lacking soredia and isidia. *Apothecia* verruciform, conspicuous, numerous, sometimes confluent, sometimes concave above, concolorous with the thallus, 1.0-1.5(-2.0) mm diam. *Ostioles* conspicuous, black, punctiform, 2-5 per verruca. *Ascospores* (3-) 4 per ascus, ellipsoid, smooth, (115-)125-150 µm long, 35-45 µm wide.

CHEMISTRY. K-, KC-, C-, Pd-; 2′-*O*-methylperlatolic acid (major), planaic acid (trace), isohyperplanaic acid (trace), methyl 2-*O*-methylperlatolate (trace), stictic acid (minor) and constictic acid (trace).

Specimen examined:
PAPUA NEW GUINEA. EASTERN HIGHLANDS PROVINCE: Goroka, Mount Kisskiss, 1 km E of Goroka, *H.J.M. Sipman 22305*, 18.iii.1987 (B).

Pertusaria novaeguineae is characterised by conspicuous apothecia, the presence of stictic and 2′-*O*-methylperlatolic acids and asci with three or four ascospores. Reported substrata include *Casuarina* and *Cocos*.

15. **Pertusaria papuana** A.W. Archer & Elix, *sp. nov.* Figure 14

Thallus hinnuleus, superficies laevis et hebetata, isidiis et sorediis destitutus; corticola. Apothecia verruciformia, dispersa, raro confluentia, plano-hemisphaerica, thallo concoloria, 0.8-1.2 mm diam. Ostiola hinnulea, inconspicua, translucentia, in verrucis singula. Ascosporae 8nae, irregulariter biseriatae, ellipsoideae vel subfusiformia, laeves, 65-75 µm longae, 25-30 µm latae.
Thallus acidum divaricaticum continens.

Type: PAPUA NEW GUINEA. EASTERN HIGHLANDS PROVINCE: Mount Kisskiss, 1 km E of Goroka, 6°04′S, 145°24′E, alt. 1700 m, on *Casuarina*, *H.J.M. Sipman 22311*, 18.iii.1987; holotype: B.

Thallus pale fawn, thin, corticolous, surface dull and smooth, lacking soredia and isidia. *Apothecia* verruciform, scattered, sometimes confluent, flattened-hemispherical, sometimes concave above, 0.8-1.2 mm diam. *Ostioles* inconspicuous, pale brown, translucent, 1 per verruca. *Ascospores* 8 per ascus, ellipsoid to subfusiform, smooth, irregularly 2-seriate, 65-75 µm long, 25-30 µm wide.

CHEMISTRY. K-, KC-, C-, Pd-; divaricatic acid (major) and methyl 2,2'-di-*O*-methyldivaricatic acid (trace).

Pertusaria papuana is characterised by asci with eight biseriate ascospores and the presence of divaricatic acid. The new species is chemically and morphologically similar to *P. orarensis* A.W. Archer & Elix, *nom. provis.*, (Archer 1997) but that species has larger ascospores, 70-92 µm long, black ostioles and contains additional 2-chlorolichexanthone. The new species also resembles P. *sydneyensis* A.W. Archer & Elix, *nom. provis.*, (Archer 1997) which also contains divaricatic acid, but that species also has larger ascospores, 87-100 µm long, and contains additional stictic acid.

16. Pertusaria parmatica A.W. Archer & Elix, *sp. nov.* Fig. 15

Sicut *Pertusaria wauensis* A.W. Archer & Elix sed lichexanthone et acidum salazinicum continens et non acidum psoromicum.

Type: PAPUA NEW GUINEA. NORTHERN PROVINCE: Owen Stanley Range, Myola, *ca.* 0.5 km along trail to Naduri, 9°09'S, 147°46'E, alt. 2100 m, on twigs from fallen tree, *A. Aptroot 37985*, 17.x.1995; holotype: CANB; isotype: herb. Aptroot.

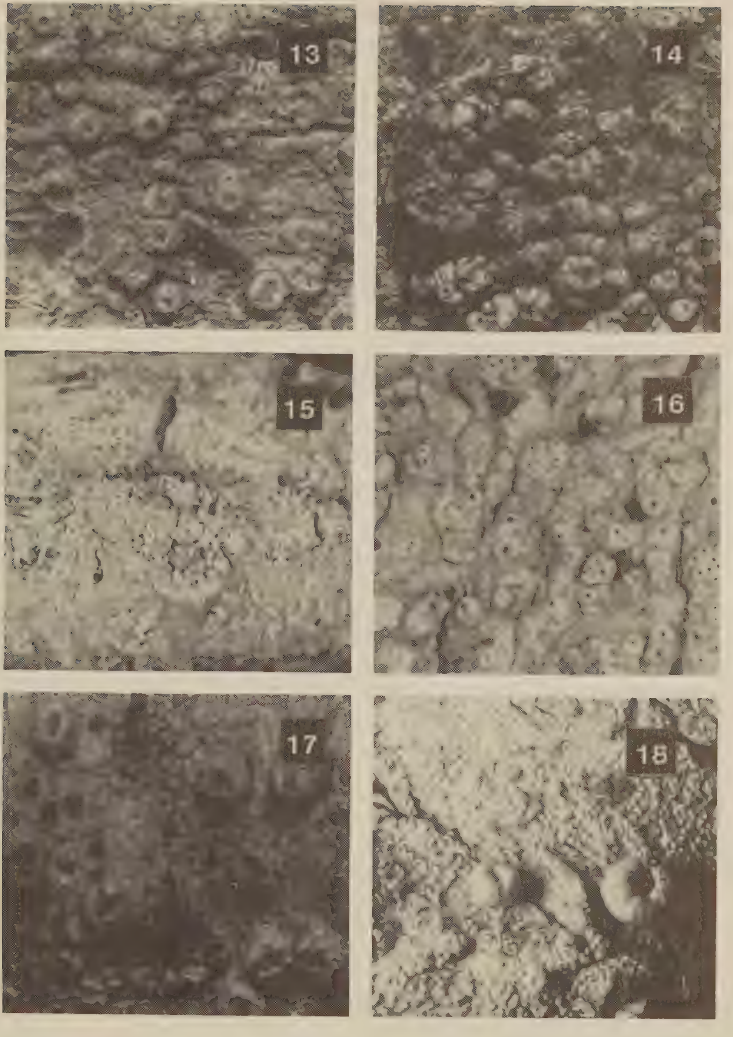
Thallus pale fawn, thin, corticolous, surface smooth and dull, lacking soredia, isidiate. *Isidia* numerous, scattered, concolorous with the thallus, sometimes darker at the tips, simple, 0.4-0.6 mm tall, 0.1 mm diam. *Apothecia* unknown.

CHEMISTRY: K+ yellow, KC-, C-, Pd+ red; lichexanthone (minor), salazinic acid (major) and consalazinic acid (trace).

Pertusaria parmatica is one of a number of isidiate *Pertusaria* species from Papua New Guinea that are differentiated by their chemistry. The new species is characterised by the presence of simple isidia, and in containing lichexanthone and salazinic acid. The type specimen gives a bright yellow fluorescence under long wavelength UV light due to the presence of lichexanthone. *Pertusaria parmatica* is known only from the type specimen from the Owen Stanley Range in Papua New Guinea. The epithet "parmatica" is derived from parmatic acid, an old name for salazinic acid (Culberson 1969: 14).

17. Pertusaria perthwaitesii A.W. Archer & Elix, *sp. nov.* Fig. 16

Sicut *Pertusaria thwaitesii* Müll. Arg. sed ascosporis parum majoribus et



Figures 13-18. New *Pertusaria* species.

13. *P. novaeguineae* x5. 14. *P. papuana* x5. 15. *P. parmatica* x3.5. 16. *P. perthwaithesii* x3.5. 17. *P. sipmanii* x5. 18. *P. yupna* x5.

acidum norsticticum continens et non acidum protocetraricum.

Type: PAPUA NEW GUINEA. NORTHERN PROVINCE: Owen Stanley Range, Myola, NE along trail from guesthouse, 9°09'S, 147°46'E, alt. 2100-2400 m, in primary montane forest on mountain slope, *A. Aptroot 37572*, 15.x.1995; holotype: CANB; isotype: herb. Aptroot.

Thallus pale fawn, thick, corticolous, surface smooth and shiny, lacking soredia and isidia. *Apothecia* verruciform, numerous, conspicuous, often confluent, subhemispherical, concolorous with the thallus, 0.5-0.8 mm diam.; when confluent, irregular in outline, 1-2 mm wide. *Ostioles* conspicuous, black, surrounded by a grey translucent zone, 1 per verruca. *Ascospores* 2 per ascus, elongate-ellipsoid, rough, 150-200 µm long, 30-40 µm wide.

CHEMISTRY: K+ red, KC-, C-, Pd+ yellow; norstictic acid (major), stictic acid (trace), methyl norstictate (trace) and psoromic acid (trace).

Specimen examined:
PAPUA NEW GUINEA. NORTHERN PROVINCE: Myola, *ca.* 2 km along trail from guesthouse, 9°08'S, 147°47'E, alt. 2400-2800 m, *A. Aptroot 37612*, 16.x.1995 (herb. Aptroot).

Pertusaria perthwaitesii is characterised by conspicuous apothecia, asci with two large ascospores with rough walls, and the presence of norstictic acid. This new species resembles *P. thwaitesii* Müll. Arg., which is also found in Papua New Guinea, but is distinguished from that species by the larger ascospores and the presence of norstictic acid; *P. thwaitesii* contains protocetraric acid. The species is known only from the type locality, and is named for its resemblance to *P. thwaitesii*.

18. **Pertusaria sipmanii** A.W. Archer & Elix, *sp. nov.* Figure 17

Thallus olivaceus, superficies laevis et nitida, isidiis et sorediis destitutus; corticola. Apothecia verruciformia, conspicua, dispersa, raro confluentia, sub-hemisphaerica, thallo concoloria, 1.0-1.5 mm diam. Ostiola conspicua, nigra, in verrucas 2-3(-5)na, 0.1-0.2 mm diam. Ascosporae 8nae, biseriatae, elongato-ellipsoideae vel subfusiformes, 180-210 µm longae, (40-)50-62 µm latae.
Thallus acidum norsticticum continens.

Type: PAPUA NEW GUINEA. MADANG PROVINCE: Huon Peninsula, Finisterre Range, Yupna valley, Teptep Village, deep valley in N direction, alt. 2600 m, 5°57'S, 146°33'E, mossy mountain forest along stream, *H.J.M. Sipman 35422*, 30.vii.1992; holotype: B.

Thallus pale olive-green, corticolous, surface smooth and shiny, lacking soredia and isidia. *Apothecia* verruciform, large, conspicuous, scattered, rarely confluent, subhemispherical, concolorous with the thallus, 1.0-1.5 mm diam., 0.8-1.0 mm tall. *Ostioles* conspicuous, black, 2-3(-5) per verruca, 0.1-0.2 mm diam., surrounded by a grey translucent zone. *Ascospores* 8 per ascus, 2-seriate, elongate-ellipsoid to subfusiform, smooth, 180-210 µm long, (40-)50-62 µm wide.

CHEMISTRY: K+ red, KC-, C-, Pd+ yellow; norstictic acid (major) and connorstictic acid (trace).

Pertusaria sipmanii is characterised by the conspicuous verrucae, the large ascospores and the presence of norstictic acid. It is distinguished from the chemically similar *P. norstictica* A.W. Archer (Archer 1991), which also occurs in Papua New Guinea, by the larger biseriate spores. The spores in *P. norstictica* are 60-95 µm long and uniseriate in the ascus. The new species is distinguished from the chemically similar *P. perthwaitesii* (*vide supra*) by the number of ascospores in the ascus. The new species is known only from the type specimen and is named after the collector, Dr. H.J.M. Sipman, who has collected extensively in Papua New Guinea and other localities.

19. **Pertusaria yupna** A.W. Archer & Elix, *sp. nov.* Figure 18

Sicut *Pertusaria scutellifera* A.W. Archer & Elix sed thallo isidioso et ascosporis minoribus.

Type: PAPUA NEW GUINEA. MADANG PROVINCE: Huon Peninsula, Finisterre Range, Yupna Valley, Teptep Village, trail in NNW direction towards Bambu Airfield, alt. *ca.* 2600 m, 5°57'S, 146°33'E, burnt forest with scattered old trees and *ca.* 5 m tall regrowth, *H.J.M. Sipman 35333*, 30.vii.1992; holotype: B.

Thallus off-white, thin, cracked, corticolous, surface smooth, lacking soredia, minutely isidiate. *Isidia* simple, concolorous with the thallus, 0.1-0.2 mm tall, 0.05 mm diam. *Apothecia* disciform, minutely isidiate, initially closed and subspherical, 0.8-1.5 mm diam., becoming open and conspicuous, dish-shaped, to 2.5 mm diam. *Disc* concave, black, weakly white pruinose. *Ascospores* 1 per ascus, ellipsoid to suballantoid, 112-132 µm long, 35-45 µm wide, ascospore wall single, 1-2 µm thick.

CHEMISTRY. K+ yellow, KC-, C-, Pd+ yellow; thamnolic acid (major).

Pertusaria yupna is characterised by conspicuous dish-shaped apothecia, asci with single ascospores and the presence of thamnolic acid. A number of other *Pertusaria* species with disciform apothecia and asci with single ascospores are known which also contain thamnolic acid. These species include *P. nigrodisca* Oshio and *P. sphaerophora* Oshio from Japan (Oshio 1968), and *P. scutellifera* A.W. Archer & Elix from New Zealand (Archer &

Elix 1994), but the ascospores in these species range from 140 µm to 230 µm long, whereas the ascospores in *P. yupna* are 112-132 µm long. The dish-like apothecia present in *P. yupna* somewhat resemble the apothecia in *P. myola*, which also occurs in Papua New Guinea (*vide supra*), but that species contains lichexanthone and picrolichenic acid. The epithet "yupna" is derived from the type locality, the Yupna Valley.

NEW REPORTS

Pertusaria irregularis Müll. Arg.
in *Bull. Herb. Boissier* **3**: 638 (1895).

Type: AUSTRALIA. QUEENSLAND: Thursday Island, *C. Knight 31 p.p.*; lectotype: G, *fide* A.W. Archer, *Telopea* **4**: 170 (1991).

Thallus pale yellowish white, corticolous, thick, coarsely cracked and areolate, surface smooth and dull, lacking isidia and soredia. *Apothecia* verruciform, inconspicuous, flattened-hemispherical, 0.8-1.0 mm diam. *Ostioles* conspicuous, black, 1-3 per verruca. *Ascospores* 2 per ascus, fusiform, smooth, (120-)130-155 µm long, 35-47 mm wide.

CHEMISTRY. K-, KC-, C-, Pd-; 4,5-dichlorolichexanthone (major) ± 2,4,5-trichlorolichexanthone (trace).

Pertusaria irregularis is an uncommon tropical species in Papua New Guinea and is also found in Australia, Fiji and New Caledonia. Reported substrata include *Avicennia* and *Bruguiera* in Australia, and *Casuarina* in Papua New Guinea. *Pertusaria irregularis* is characterised by asci with two smooth fusiform ascospores and the presence of 4,5-dichlorolichexanthone as the major lichen compound.

Specimens examined:
AUSTRALIA. QUEENSLAND: Ross Creek, Yeppoon, *J.A. Elix 34611* (CANB); Endeavour River, 11 km from Cooktown, *D. Verdon 5432* (CANB).
FIJI. Kadavu Island, *R. Poulsen s.n.* (NSW).
NEW CALEDONIA. Balabe, *E. Vieillard s.n.* (G).
PAPUA NEW GUINEA. CENTRAL PROVINCE: Varirata National Park, *A. Aptroot 39524* (herb. Aptroot).

Pertusaria petrophyes C. Knight
in *Trans. Linn. Soc. Lond. ser.* **2**, 2: 47 (1881).

Type: AUSTRALIA. NEW SOUTH WALES: [near Sydney], *C. Knight s.n.*; holotype: WELT; isotype: H-NYL 23608.

= *Pertusaria leucoxantha* Müll. Arg.
in *Bull. Herb. Boissier* **3**: 637 (1895).

Type: AUSTRALIA. QUEENSLAND: Thursday Island, *C. Knight 280*, 1887; holotype: G.

DESCRIPTION. *Thallus* pale fawn or pale dull yellowish green, thin to effuse, saxicolous, surface smooth and dull, lacking isidia and soredia. *Apothecia* verruciform, few to numerous, sometimes confluent, flattened-hemispherical or irregular in outline, 0.5-1.5 mm diam. *Ostioles* black, 1-2 per verruca, sometimes raised. *Ascospores* 8 per ascus, irregularly uniseriate, ellipsoid, smooth, 60-85 µm long, 25-45 µm wide.

CHEMISTRY. K-, KC+ weak orange, C+ weak orange, Pd-; thiophaninic acid (major), 2-*O*-methylperlatolic acid (major) and 2-chloro-6-*O*-methylnorlichexanthone (trace).

Pertusaria petrophyes is a rare species in Papua New Guinea, but is more widely distributed in eastern Australia (Queensland, New South Wales and Victoria) and also occurs on Lord Howe Island and in New Zealand. The species is characterised by asci with eight ascospores and the presence of thiophaninic and 2-*O*-methylperlatolic acids.

Specimens examined:
AUSTRALIA. QUEENSLAND: Pine Mountain, 24 km NE of Rockhampton, *J.A. Elix 34717* (CANB); Cunninghams Gap National Park, *J. Hafellner 15304* (GZU); *s.loc.*, *J. Shirley 1334*, Sept. 1889 (NSW); Brisbane, *F.R.M. Wilson s.n.*, Aug. 1896 (NSW L46738).
NEW SOUTH WALES: Dora Pinnacle, 10 km NW of Morisset, *A.W. Archer P211* (NSW); Hat Head National Park, Hat Head summit, *A.W. Archer P386* (NSW); Bournda Lagoon, 8 km N of Merimbula, *A.W. Archer P533* (NSW); Boulder Bay, 3 km S of Tathra, *A.W. Archer P562* (MEL, NSW); Sydney, Hills of Mona Vale, *P. Bibby s.n.* (MEL 1023569); Lord Howe Island, ridge to Malabar Hill, *J.A. Elix 32966* (CANB); Waihou Trig, 25 km NW of Coffs Harbour, *D. Verdon 3796* (CANB).
VICTORIA: Mallacoota, Mallacoota Inlet, *A.W. Archer P548* (NSW).
NEW ZEALAND. NORTH ISLAND: Three Kings Island, *B. Hayward s.n.* (AK 206648, 206950).
PAPUA NEW GUINEA. CENTRAL PROVINCE: Varirata National Park, 22 km E of Port Moresby, *A. Aptroot 39843* (herb. Aptroot).

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KEY TO THE LICHEN GENUS *PERTUSARIA* IN PAPUA NEW GUINEA

Corticolous species:
Sterile species, isidiate or sorediate .... Group A
Fertile species, with apothecia
Species with disciform apothecia
Ascospores 1 or 2 per ascus .... Group B
Ascospores 8 per ascus .... Group C

Species with verruciform apothecia
Ascospores 2 or 4 per ascus
Ascospores 2 per ascus .... Group D
Ascospores 4 per ascus .... Group E
Ascospores 8 per ascus
Ascospores 1-seriate .... Group F
Ascospores 2-seriate .... Group G

Saxicolous and terricolous species .... Group H

Group A: corticolous species, sterile, isidiate or sorediate

1. Thallus sorediate 8
1a. Thallus isidiate 2

2. Thallus Pd+ yellow or red 3
2a. Thallus Pd- 5

3. Thallus Pd+ red, lichexanthone and salazinic acid present . *P. parmatica*
3a. Thallus Pd+ yellow, lichexanthone absent 4

4. Thallus K+ red, norstictic acid present .... *P. ramulifera*
4a. Thallus K-, psoromic acid present .... *P. wauensis*

5. 4,5-Dichlorolichexanthone present 6
5a. 4,5-Dichlorolichexanthone absent 7

6. Stictic acid present .... *P. montpittensis*
6a. Stictic acid and methylbarbatate present .... *P. anagabangensis*

7. 2′-*O*-Methylperlatolic acid present .... *P. burburana*
7a. Hypoprotocetraric acid present .... *P. hypoprotocetrarica*

8.(1) Soralia Pd+ yellow 9
8a. Soralia Pd- 10

9. Soralia K+ yellow, thamnolic acid present .... *P. scaberula*
9a. Soralia K-, psoromic acid present .... *P. psoromica*

10. Soralia K+ violet, hypothamnolic acid present .... *P. tropica*
10a. Soralia K- 11

11. Soralia KC+ violet, picrolichenic acid present .... *P. bululoensis*
11a. Soralia KC-, 4,5-dichlorolichexanthone and stictic acid present .... *P. balekensis*

Group B: apothecia disciform, ascospores 1 or 2 per ascus

1. Ascospores 1 per ascus 2
1a. Ascospores 2 per ascus, C+ red, lecanoric acid present .... *P. philippina*

2. Discs K+ violet or yellow 3
2a. Discs K- 4

3. Discs K+ violet, hypothamnolic acid present .... *P. tropica*
3a. Discs K+ yellow, thamnolic acid present .... *P. yupna*

4. Discs KC-, lichexanthone present .... *P. asterella*
4a. Discs KC+ red or violet 5

5. Discs KC+ red, lecanoric acid present .... *P. velata*
5a. Discs KC+ violet, picrolichenic acid present .... *P. myola*

Group C: apothecia disciform, ascospores 8 per ascus

1. Discs K+ yellow, thamnolic acid present 2
1a. Discs K- 3

2. Ascospores spherical, 1-seriate .... *P. gongylospora*
2a. Ascospores ellipsoid, 2-seriate .... *P. epitheciifera*

3. Discs KC- .... *P. gyalectoides*
3a. Discs KC+ red, lecanoric acid present 4

4. Ascospores 1-seriate, 30-50 µm long .... *P. pycnophora*
4a. Ascospores 2-seriate, 60-70 µm long .... *P. kaindiensis*

Group D: apothecia verruciform, ascospores 2 per ascus

1. Inner ascospore wall rough 2
1a. Inner ascospore wall smooth 6

2. Thallus Pd+ orange or yellow 3
2a. Thallus Pd- 4

3. Thallus Pd+ orange, K-, protocetraric acid present, ascospores 110-160 µm long.......... *P. thwaitesii*
3a Thallus Pd+ yellow, K+ red, norstictic acid present, ascospores 150-200 µm long.......... *P. perthwaitesii*

4. Stictic acid present, ascospores 110-125 µm long..........5
4a. Stictic acid absent, ascospores 185-250 µm long.......... *P. subsorodes*

5. Chlorinated xanthones absent.......... *P. cicatricosa* var. *deficiens*
5a. Chlorinated xanthones present.......... *P. cicatricosa*

6. (1a) Thallus with 4,5-dichlorolichexanthone..........7
6a. Thallus with di- and trichlorolichexanthones; thallus with 2-*O*-methylperlatolic acid and stictic acid, ascospores 80-105 µm long....*P. damiensis*

7. Thallus with stictic acid..........9
7a. Thallus lacking stictic acid..........8

8. Thallus with 2'-*O*-methylperlatolic acid.......... *P. pycnothelia*
8a. Thallus lacking 2′-*O*-methylperlatolic acid.......... *P. irregularis*

9. Thallus lacking 2′-*O*-methylperlatolic acid; ascospores 85-100 µm long... .... *P. pseudococcodes*
9a. Thallus with 2'-*O*-methylperlatolic acid, ascospores 163-200 µm long..... .... *P. copelandii*
[may also contain 4 ascospores per ascus]

Group E: apothecia verruciform, ascospores 4 per ascus.

1. Inner ascospore wall rough..........2
1a. Inner ascospore wall smooth..........3

2. Di- and trichlorolichexanthones and 2-*O*-methyl- and 2′-*O*-methylperlatolic acids present.......... *P. elliptica*
2a. 4,5-Dichlorolichexanthone, 2′-*O*-methylperlatolic and stictic acids present.......... *P. microstoma*

3. Thallus with higher homologues of perlatolic acids..........4
3a. Thallus lacking higher homologues of perlatolic acids..........6

4. Thallus lacking 4,5-dichlorolichexanthone..........5
4a. Thallus with 4,5-dichlorolichexanthone.......... *P. streimannii*

5. Lichexanthone absent.......... *P. manamensis*
5a. Lichexanthone present.......... *P. modesta*

6. Thallus with dichlorolichexanthones..........7
6a. Thallus lacking dichlorolichexanthones..........10

7. Thallus with 2,5-dichlorolichexanthone and stictic acid ....*P. ceylonica*
7a. Thallus with 4,5-dichlorolichexanthone 8

8. Stictic acid present..9
8a. Stictic acid absent...10

9. 2-*O*-Methylperlatolic acid present ....*P. laeana*
9a. 2′-*O*-Methylperlatolic acid present ....*P. copelandii*

10. 2'-*O*-Methylperlatolic acid present...*P. hermaka*
10a. 2-*O*-Methylconfluentic acid present...*P. bogia*

11. Thallus lacking lichen compounds ....*P. plethocarpa*
11a. Thallus with lichen compounds 12

12. Thallus K+ red, norstictic acid present.................................*P. naduriensis*
12a. Thallus K-, norstictic acid absent 13

13. Thallus KC+ orange; 6-*O*-methylarthothelin or thiophaninic acid ....
present...14
13a. Thallus KC-; 2′-*O*-methylperlatolic and stictic acid present........................
....*P. novaeguineae*

14. Thiophaninic and 2′-O-methylperlatolic acids present.........*P. rechingeri*
14a. 6-*O*-Methylarthothelin present...*P. inconspicua*

Group F: apothecia verruciform, ascospores 8 per ascus, 1-seriate

1. Thallus with 4,5-dichlorolichexanthone...2
1a. Thallus lacking 4,5-dichlorolichexanthone 4

2. Thallus with confluentic or 2, 2′-di-*O*-methylstenosporic acid 3
2a. Thallus with 2′-*O*-methylperlatolic acid............................ *P. allogibberosa*

3. Thallus with confluentic acid ....*P. weberi*
3a. Thallus with 2, 2′-di-*O*-methylstenosporic acid ....*P. subplanaica*

4. Thallus with 2-*O*-methylstenosporic acid ....*P. kagamugana*
4a. Thallus with divaricatic acid..*P. papuana*

Group G: apothecia verruciform, ascospores 8 per ascus, 2-seriate

1. Inner ascospore wall rough, ascospores 105-135 µm long..........................
....*P. anomalospora*
1a. Inner ascospore wall smooth 2

2. Thallus K+ red, norstictic acid present......................................*P. sipmanii*
2a. Thallus K-, norstictic acid absent 3

3. Thallus KC+ orange, containing 6-*O*-methylarthothelin or thiophanic acid 4
3a. Thallus KC-, lacking thiophanic acid and 6-*O*-methylarthothelin..........5

4. Thallus with thiophanic acid; isidiate.................................. *P. karkarensis*
4a. Thallus with 6-*O*-methylarthothelin; lacking isidia................*P. howeana*

5. Thallus with 4,5-dichlorolichexanthone and stictic acid ... *P. leiocarpella*
5a. Thallus with atranorin and confluentic acid........................ *P. gorokorana*

Group H: saxicolous and terricolous species

1. Thallus sorediate...2
1a. Thallus esorediate, with fertile verrucae; ascospore walls smooth.........5

2. Thallus terricolous, with chlorinated lichexanthones and stictic acid ....*P. puffina*
2a. Thallus saxicolous 3

3. Thallus UV obscure, yellowish fawn; 4,5-dichlorolichexanthone............ ....*P. balekensis*
3a. Thallus UV+, orange or yellow 4

4. Thallus yellow, UV+ orange, with thiophaninic acid....... *P. xanthoplaca*
4a. Thallus white, UV+ yellow, with lichexanthone.. ....*P. subventosa* var. *hypothamnolica*

5. Ascospores 2 per ascus, 4,5-dichlorolichexanthone and stictic acid present.......................................6
5a. Ascospores 4 or 8 per ascus 7

6. Ascospores (120-)135-175 µm long.................................*P. vulpina*
6a. Ascospores 95-115 µm long...*P. atrospilota*

7. Ascospores 8 per ascus; 2-*O*-methylperlatolic acid present........................8
7a. Ascospores 4 per ascus; 2-*O*-methylsuperlatolic acid present..*P. aptrootii*

8. Lichexanthone present ....*P. consanguinea*
8a. Thiophaninic acid present..*P. petrophyes*

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CHANGBAI WOOD-ROTTING FUNGI 8. HYPHODONTIA SYRINGAE SP. NOV.

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ENGLISH ABSTRACT

During a survey of wood-rotting fungi of the Changbai mountains in China a new poroid species of *Hyphodontia* (Basidiomycetes, Corticiaceae) was found on *Syringa*. *Hyphodontia syringae* is described, illustrated and compared with related species. The new species belongs to the *H. crustosa* group which is characterized by thin-walled cystidia, basidial repetition and the occurrence of poroid basidiocarps in some species. *H. syringae* is very closely related to *H. apacheriensis*, *H. nothofagi* and *H. niemelaei*.

CHINESE ABSTRACT

經由調查中國大陸長白山一帶的木材腐朽菌，結果發現了一個長在 *Syringa* 植物具孔狀的 *Hyphodontia* 新種 (擔子菌綱、皮革菌科)，命名爲 *Hyphodontia syringae*, 屬於 *H. crustosa* 類群，其主要特徵是具有薄壁的囊狀體、擔子複生及具有孔狀的子實體。本文就此新種作描述及繪圖，並與 *H. apacheriensis, H. nothofagi* 與 *H. niemelaei* 等非常相似的種作比較討論。

Key words: Basidiomycetes, Aphyllophorales, Corticiaceae, wood-rotting fungi, *Hyphodontia*, *Syringa*, new species, China, Changbai, taxonomy.

Species of the genus *Hyphodontia* John Erikss. emend. E. Langer are resupinate Corticiaceae showing a multitude of different cystidia and spore types, suburniform basidia, a typical hyphal branching mode, white-rot on different kinds of wood, slow hyphal growth on common malt-agar and dolipores with continuous parenthesomes (E. Langer et Oberwinkler, 1993; E. Langer, 1994). Classically *Hyphodontia* species with smooth or odontioid basidiocarps have been separated strictly from the related poroid species in the genus *Schizopora* Velen. In a more modern view, following phylogenetic guidelines, more and more poroid species have been described or combined in *Hyphodontia* (Hjortstam et Ryvarden, 1986; Wu, 1990). The genus *Schizopora* was described by Velenovsky (1922) and is therefore older than *Hyphodontia* described by John Eriksson (1958). To evade nomenclatorical instability in the sense of ICBN the younger name *Hyphodontia* was proposed to be conserved against *Schizopora* Velen. (E. Langer et al., 1996).

The inventory of Aphyllophorales in East Asia has not that long tradition when compared with European or North American regions. Therefore it is likely that many new species are discovered with further investigations. New species or records of Aphyllophorales have been described e.g. by Bo et Bau (1980), Dai et Renvall (1994), Dai et Niemelä (1995), Dai (1995), Hjortstam et Ryvarden (1982), Oberwinkler et Tschen (1989) and Wu (1990). New *Hyphodontia* species from Asian regions have been described by Wu (1990) and E. Langer et al. (1992). During a survey of wood-rotting fungi of the Changbai mountains in China a new poroid species of *Hyphodontia* was found on dead branches of *Syringa reticulata* var. *mandshurica* and deciduous wood.

Hyphodontia syringae E. Langer sp. nov. (Fig. 2-5)
Carposomata resupinata, odontioidea, poroidea, albido-cremea. Aculei 3 mm, pori 5 mm longi, 500 µm latis. Hyphae tenuitunicatae, fibulatae, 2-3 µm in diametro. Basidia suburniformia, fibulata, 4-5 x (17-)20-32(-35) µm, repetentes, sterigmatibus 4. Basidiosporae leves, suballantoideae, (7.5-)8-9 x (2-)3-3.5 µm, hyalinae, tunicis laevibus, inamyloideis. Cystidia tunicis laevibus, 30-50 x 6-10 µm, constrictis, fibulata, emergens hymenio vel subhymenio solis. In corticem Syringae crescit. Holotypus Dai 1215B in H. Paratypi Dai 1154, Dai 1992 in H.

Basidiocarp resupinate, odontioid to poroid, adnate, white to cream colored when fresh, cream-coloured to yellowish when dried, up to 17 x 3 cm large, margin abrupt, aculei first single standing and up to 3 mm long, then confluent building up pore walls up to 5 mm long and ca. 500 µm wide, pores not regularly in shape and 1-3 mm in diameter.
Basidiospores (7.5-)8-9 x (2-)3-3.5 µm, suballantoid, thin-walled, smooth, hyaline, inamyloid.
Basidia (17-)20-32(-35) x 4-5 µm, young clavate, mature suburniform with one basal clamp each and one to two constrictions, basidial repetition occurring frequently.
Sterigmata four, up to 3 µm long.

Cystidia 30-50 x 6-10 µm, thin-walled to slightly thick-walled, constricted several times, arising only from the subhymenium or hymenium.
Clamps present at all primary septa, one clamp per septum.
Hyphal system monomitic. Subicular hyphae 2-3 µm in diameter, slightly thick-walled (< 0.5 µm), incrusted with crystals which are soluble in 5% KOH solution. Subhymenial hyphae 2-3 µm in diameter, thin-walled. Hyphal branching by subseptal outgrowing or outgrowing of clamps. Hyphal ramification in the subhymenium very dense with many collapsed hyphae from older parts of the hymenium.
Pore walls consiting of slightly thick-walled, densely and parallel running hyphae.

Habitat and substrate: In montane forests of the Changbaishan Forest Reserve on bark of dead branches of of *Syringa reticulata* var. *mandshurica* and deciduous trees.

Specimens studied: China, Jilin prov., Changbaishan Forest Reserve, on dead of *Syringa reticulata* var. *mandshurica,* leg. Y.-C. Dai, 1993.IX.7., Herbarium Dai 1154. China, Jilin prov., Changbaishan Forest Reserve, on dead *Syringa reticulata* var. *mandshurica,* leg. Y.-C. Dai, 1993.IX.11., Herbarium Dai 1215B. China, Jilin prov., Changbaishan Forest Reserve, on dead deciduous wood, leg. Y.-C. Dai, 1995.IX.9., Herbarium Dai 1992.

Remarks: *H. syringae* belongs to the *H. crustosa* group which is characterized by thin-walled cystidia, basidial repetition and the occurrence of poroid basidiocarps in some species (E. Langer 1994). *H. syringae* is very closely related to *H. apacheriensis* (Gilb. et Canf.) Hjortst. et Ryvarden, *H. nothofagi* (G.H. Cunn.) E. Langer and *H. niemelaei* Wu. They all show poroid basidiocarps, thinwalled cystidia and repetitive basidia. The nearest relative of *H. syringae* is *H. nothofagi* described by G.H. Cunningham (1965) from New Zealand. Both species share suballantoid basidiospores, but *H. syringae* differs from *H. nothofagi* by longer basidia and basidiospores. Moreover the cystidia of *H. syringae* have a significant different form and size. The pore width is much bigger than in *H. nothofagi*.

Illustrations and descriptions of *H. syringae* and *H. nothofagi* can also be compared on the WorldWideWeb under
http://www.uni-tuebingen.de/uni/bbm/mycology/hompage.htm.

	H. syringae	*H. nothofagi*
Basidia	(17-)20-32(-35) x 4-5 µm	20-24 x 4-5 µm
Basiospores	(7.5-)8-9 x (2-)3-3.5 µm	6.5-8 x 2.5-3 µm
Cystidia	30-50 x 6-10 µm, constricted	30 x 5 µm, capitate
Pores	1-3 mm in diameter	0.25-1 mm in diameter

The four poroid species of the *H. crustosa* group can be distinguished easily by the size of spores and cystidia:

Spores shorter than 6 µm, ellipsoid to subglobose
  Sp. subglobose, width > 4 µm .... *H. apacheriensis*
  Sp. ellipsoid, width < 4 µm .... *H. niemelaei*
Spores longer than 6 µm, suballantoid
  Cystidia capitate, up to 30 µm long .... *H. nothofagi*
  Cystidia constricted, up to 50 µm long... *H. syringae*

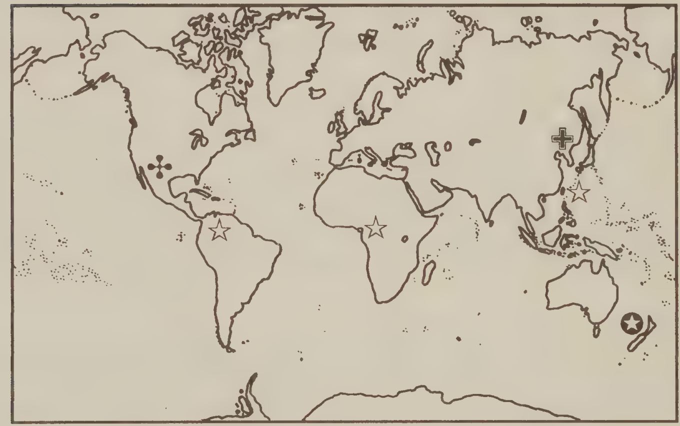

Fig 1. Records of poroid species of the *H. crustosa* group: ✚ *H. syringae*, ☆ *H. niemelae*, ✪ *H. nothofagi*, ✣ *H. apacheriensis*.

Most of the poroid species of the *H. crustosa* group seem to appear in montane forests in subtropical to tropical regions (Fig. 1): *H. syringae* has been found in montane forests of the Changbai mountains in China. *H. niemelaei* has been collected in subtropical to tropical montane forests, namely in Taiwan on *Cryptomeria japonica* and *Itea oldhamii* (Wu, 1990), in Columbia, Sierra Nevada, but also in lowland rain forest in Cameroon (specimens in Herbarium Leif Ryvarden). *H. apacheriensis* has been described and recorded several times in dry regions of subtropical North America on different kinds of Gymno- and Angiosperm wood, upon them unusual substrates like *Prosopsis* (Mimosaceae) and *Agava* (Agavaceae) (Gilbertson et Ryvarden, 1987; Gilbertson et Canfield, 1973). *H. nothofagi* has been described only from montane forest in New Zealand on *Nothofagus cliffortioides* (G.H. Cunningham, 1965).

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We greatfully acknowledge the help of Mr. C.-J. Chen and Mr. Z. Yang with formulating and printing the Chinese abstract. Prof. Dr. Tuomo Niemelä (Helsinki, Finland) made valuable suggestions to improve the manuscript. Prof. Dr. A. Bresinsky (Regensburg, Germany) acted as pre-submission reviewer. We thank our teachers Prof. Dr. F. Oberwinkler and Prof. Dr. T. Niemelä for providing us generously with everything which is necessary for advanced research. Financial support from the BMBF No. 0310735 (Germany) and CIMO (Finland) is gratefully acknowledged.

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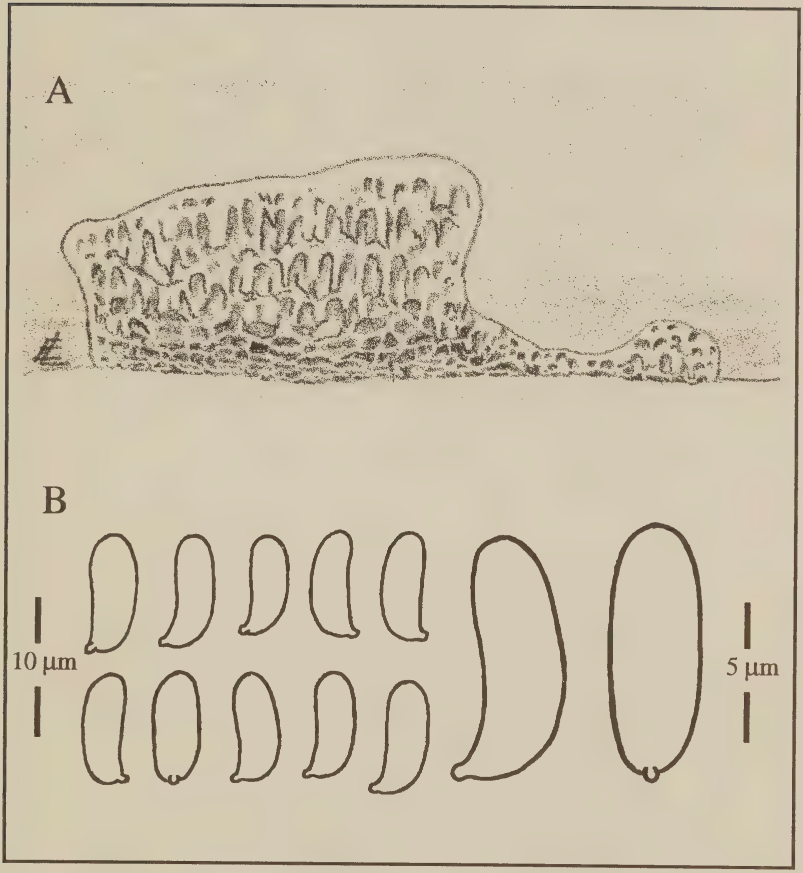

Fig. 2. A: *H. syringae*. Resupinate poroid basidiocarp with abrupt margin and unregular large pores. Paratype Dai 1992 in H, del E. Langer. B: *H. syringae*. Typical suballantoid basidiospores shown in different views and magnifications. Holotype DAI 1215B, del. E. Langer.

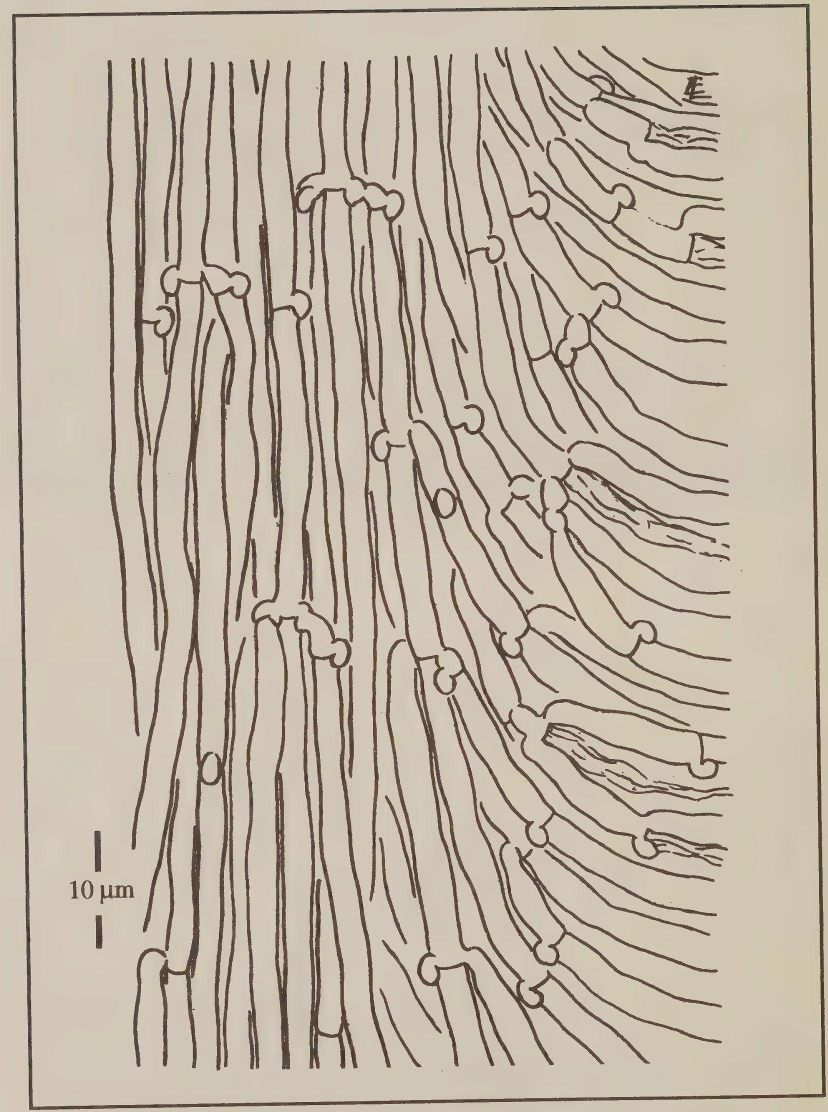

Fig. 3. *H. syringae*. Cross-section of the trama of a pore wall. Slightly thick-walled hyphae are running parallel down to the tip of the pore mouth. Towards the subhymenium thin-walled hyphae branch off by subseptal outgrowing or outgrowing of clamps. Holotype DAI 1215B in H, del. E. Langer.

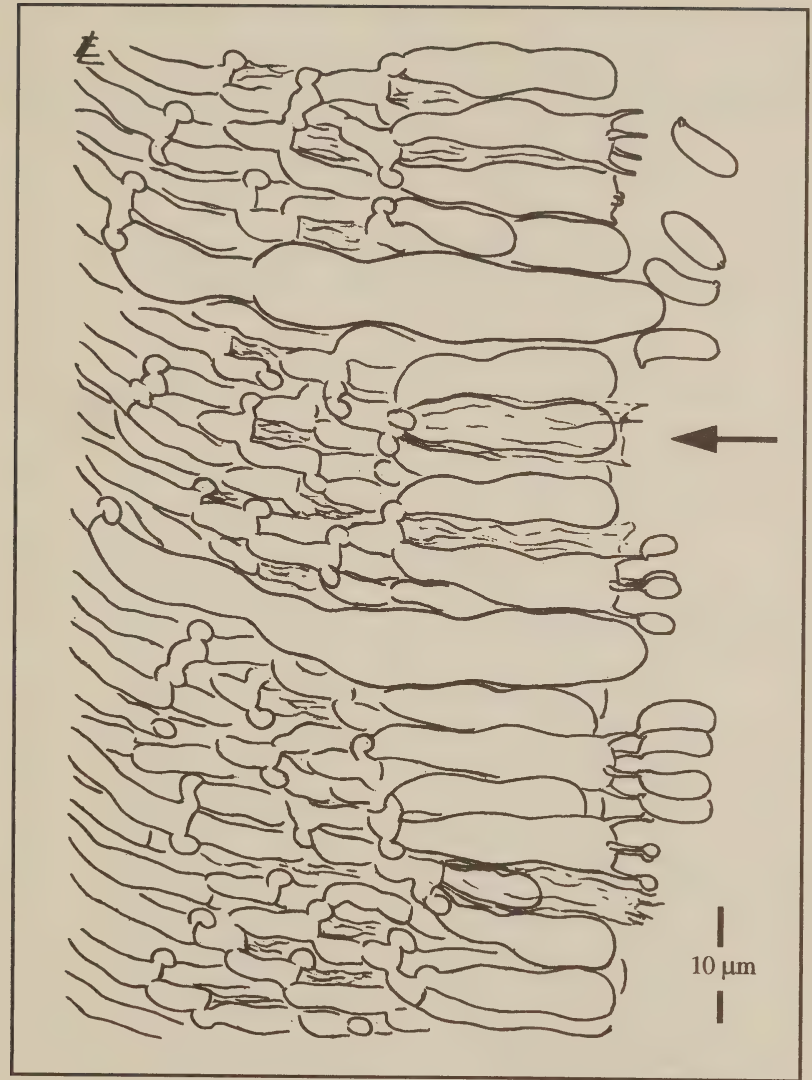

Fig. 4. *H. syringae*. Cross-section of the hymenium and subhymenium. Within the hymenium basidia of different ontogenetic stages are present. Basidial repetition occurs frequently (arrow). Constricted and slightly thick-walled cystidia arise only from the hymenium or subhymenium. Paratype DAI 1154 in H, del. E. Langer.

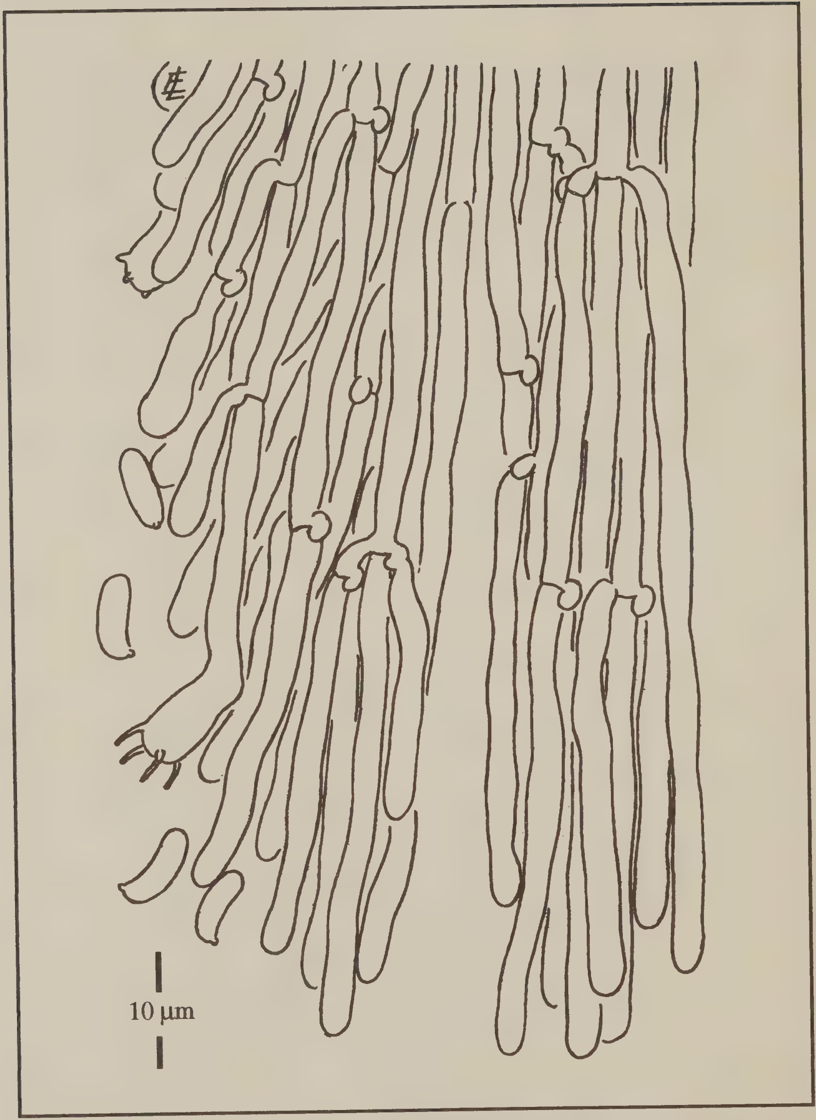

Fig. 5. *H. syringae*. Cross-section of the tip of a pore mouth. Basidia occur almost down to the pore mouth, sometimes showing a stalk-like elongation of the basidial base. Paratype DAI 1215, in H, del.: E. Langer.

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STUDIES ON THE MEDICINAL POLYPORE, PHELLINUS BAUMII, AND ITS KIN, P. LINTEUS

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ABSTRACT

Phellinus linteus (Berk. & M.A. Curtis) Teng has been widely reported in Asia, and considered to be a medicinal fungus in China, Japan and South Korea. A study of material from Northeast Asia revealed that the concept of the species has been misinterpreted, and the Asian fungus is in fact *Phellinus baumii* Pilát rather than *P. linteus*. Both species are described and illustrated. *P. baumii* is characterized by smaller, broadly ellipsoid spores, 3.3–4.5 × 2.4–3.5 µm; its tramal skeletals are parallel, mostly < 3 µm in diam, and they remain unchanged in KOH. The basidiocarps have a blunt edge and a distinct, wide sterile zone bordering the pore surface. *P. linteus* has larger, subglobose spores, 4.3–5.5 × 3.8–4.8 µm; its tramal skeletals are loosely interwoven, mostly > 3 µm in diam, and they swell in KOH. The basidiocarps of *P. linteus* have a more or less acute edge, and a narrow to indistinct sterile margin below. The former species is widely distributed in temperate Asia, and lives mostly on *Syringa* and *Lonicera* in Northeast Asia. The latter is most probably tropical American and African in its distribution, and its host tree species are not well-known.

Key words: Basidiomycetes, Hymenochaetaceae, medicinal fungus, *Phellinus baumii*, *P. linteus*, polypores, taxonomy

INTRODUCTION

Phellinus linteus (Berk. & M.A. Curtis) Teng was originally described from Nicaragua, and it is distributed in the Gulf Coast Region of the USA and Mexico (Gilbertson and Ryvarden, 1986–1987), Costa Rica, Panama, Cuba, Bahama Island, Puerto Rico, Trinidad and Brazil (Lowe, 1957), and in Northern Argentina (Ibañez, 1995). *P. linteus* has been widely reported in China (Anonymous, 1983; Li, 1991; Liu *et al.*, 1982; Tai, 1979; Teng, 1963; Zhao and Zhang, 1992). Elsewhere in Asia the fungus was recorded in South Korea (Jung, 1994), India (Sharma, 1995), the Russian Far East, Siberia, Central Asia and Caucasus (Bondartseva and Parmasto, 1986), and in Ural mountains (Ryvarden and Gilbertson, 1994); it was reported as *Phellinus yucatanensis* (Murrill) Imazeki in Japan (Ito, 1955).

Phellinus linteus has been considered to be a traditional Chinese medicine (Ying *et al.*, 1987), and it was reported to have anticancer properties (Ikekawa *et al.*, 1968; Chung *et al.*, 1993). Several studies on the activities of polysaccharides from *P. linteus* were carried out (Kim *et al.*, 1994; Lee *et al.*, 1995; Naruse *et al.*, 1974; Song *et al.*, 1995).

Extensive collections from different parts of China and some specimens from Japan, South Korea and the Russian Far East were carefully studied for this investigation. They turned out to deviate from the American *P. linteus* in having significantly smaller spores and narrower tramal skeletal hyphae, and unchanged hyphae in KOH. They were all identified as *P. baumii* Pilát, which was described from Vladivostok in the Russian Far East (Pilát, 1932). The name *P. linteus* has been repeatedly used in Chinese and other Asian literature, and even recently Teng (1996:341) merged *P. baumii* to *P. linteus*. The differences between *P. linteus* and *P. baumii* have not been critically discussed before; after studying the types of both the species and their synonyms, and examining more collections from Asia, Central America and Africa, we give an illustrated description of the two species. The microscopical routine used in the study is the same as presented by Dai (1995). Voucher specimens collected by Y.C. Dai are deposited in Helsinki (H), and duplicates are preserved in HMAS and NMNS.

DESCRIPTION

Phellinus baumii Pilát (Fig. 1)
Bull. Soc. Mycol. France 48:25. 1932 (holotype, studied). — *Fomes lonicerinus* Bondartsev, Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 2, Sporov. Rast. 2:500. 1934 (holotype, studied).

Basidiocarps perennial, mostly ungulate, occasionally dimidiate, rarely effused-reflexed, up to 10 × 7 × 5 cm, woody hard; upper surface dark grayish to almost black, matted to glabrous, concentrically zonate and shallowly sulcate, radially rimose and cracking, sometimes covered with mosses; edge round, blunt, dull brownish; poroid surface brown, dull brown to dark brown, shining, sterile margin distinct, up to 5 mm wide, yellowish brown, receding in old fruit bodies, pores angular to circular, (6–)7–10(–11) per mm (n=160/14, 8–9 per mm in the type), dissepiments thin, entire. Context brown to dull brown, woody hard, up to 1 cm thick (distinctly thinner than tubes), somewhat radially fibrous, slightly resinous in old basidiocarps. Tubes golden brown in young layers to brown in old ones, up to 3 cm long, tube layers indistinct, annual layers mostly less than 1.5 mm thick.

Hyphal system monomitic in context, dimitic in trama; all septa without clamp connections; tissue darkening but otherwise unchanged in KOH.

Context. — Contextual hyphae varying from hyaline and thin-walled to golden yellow and fairly thick-walled, lumen significantly wider than walls, all the hyphae frequently with simple septa, regularly arranged, (4–)4.2–6 µm in diam (n=35/1), (4.5–)4.6–6(–6.1) µm in diam in KOH (n=30/1).

Tubes. — Trama dominated by skeletal hyphae, generative hyphae thin-walled, hyaline, occasionally branched, CB+, (1.5–)1.8–2.9(–3.2) µm in diam (n=30/1); skeletal hyphae yellowish brown, thick-walled, bearing a distinct lumen or subsolid, rarely simple-septate, unbranched, parallel, (2–)2.1–3.1(–3.2) µm in diam (n=84/4), (2.5–)2.6–3.2(–3.5) µm in diam in KOH (n=30/1). Hymenial setae frequent to scanty, mostly ventricose, thick-walled, (12–)14–24(–27) × (4–)5–9(–12) µm (n=141/11). Fusoid cystidioles and rhomboid crystals occasionally present. Basidia narrowly barrel-shaped, with four sterigmata, (7–)7.5–11(–12) × (4.3–)4.5–6 µm (n=39/4); basidioles barrel-shaped to subglobose, slightly smaller than basidia.

Spores. — Basidiospores basicly broadly ellipsoid, juvenile ones thin- to fairly thick-walled, CB+, mature ones thick-walled, yellowish, IKI–, CB–, (2.8–) 3.3–4.5(–5) × (2.1–)2.4–3.5(–4.2) µm, L = 3.91 µm, W = 2.99 µm, Q = 1.23–1.40 (n=420/14); in the type (3.7–)3.8–4.2(–4.8) × (2.9–)3–3.5(–3.6) µm, L = 4.06 µm, W = 3.16 µm, Q = 1.29 (n=30/1).

Distribution and hosts. — We have studied *Phellinus baumii* in the field in North China, and herbarium material was studied from other parts of China, South Korea, Japan, the Russian Far East and Siberia. The species is fairly common in northern China, and mostly lives on living trees of *Syringa* and *Lonicera*. It can fruit on several other genera of angiosperms. Recently the fungus has been successfully cultivated in South Korea (Chung Hearn Ryu, pers. comm.).

Specimens studied. — **China**. Beijing, *Prunus*, 1.XI.1993 *Dai 1754*; ?*Syringa*, 1.XI.1993 *Dai 1761* & *Dai 1767*; *Syringa*, 26.IX.1993 *Dai 1338*; Guangxi, 24.I.1958 *Xu 949* (HMAS 43822); Jilin, *Fraxinus*, 24.VII.1993 *Dai 683*; *Lonicera*, 16.X.1993 *Dai 1611*; *Syringa*, 13.VII.1993 *Dai 499*, 20.VII.1993 *Dai 618*, 7.IX.1993 *Dai 1137*, 11.IX.1993 *Dai 1215*, 19.X.1993 *Dai 1743*, 9.IX.1995 *Dai 1993*, 8.VIII.1997 *Dai 2340*; Sichuan, angiosperm, 9.V.1939 *Teng 3270* (BPI

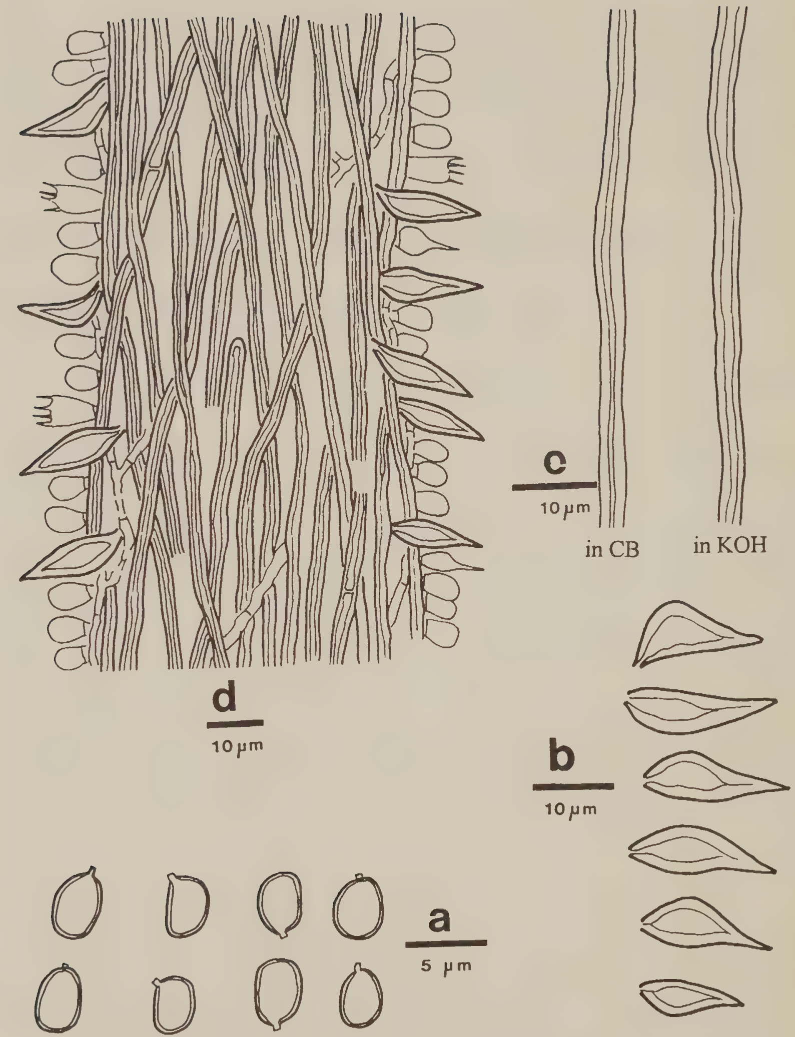

c
10 µm
in CB
in KOH
d
10 µm
b
10 µm
a
5 µm

Fig. 1. Microscopic structures of *Phellinus baumii* Pilát (drawn from *Dai 1743*). —a) spores, —b) setae, —c) tramal skeletal hyphae, —d) a vertical section through trama.

235288), 15.IV.1940 *Teng 3599* (BPI 235282). **South Korea**. Andong, Kyung–sangbuk-do, *Hemiptelea*, 18.VIII.1994 *Han & Han* (MKM 940818); Seoul, *Morus*, XII.1996 *Ryu* (H); VII.1997 *Ryu* (H). **Japan**. Nagano, angiosperm, 6.VII.1994 *Núñez 540* (O). **Russia**. Montes Kopet-dagh, *Lonicera*, 28.X.1971 *Parmasto* (TAA 55647, H); Khabarovsk, *Syringa*, 11.IX.1976 *Alanko* (TAA 32324, H); Primorye, *Lonicera*, 2.VI.1976 *Parmasto* (TAA 100080), 22.V.1983 *Parmasto* (TAA 105296); Vladivostok, *Syringa*, 5.VI.1928 *Ziling 267* (PRM 189012, holotype).

Phellinus linteus (Berk. & M.A. Curtis) Teng (Fig. 2)
Fungi of China, p. 467. 1963. — *Polyporus linteus* Berk. & M.A. Curtis, Proc. Amer. Acad. (Boston) 4:122. 1860 (holotype, studied). — *Pyropolyporus yucatanensis* Murrill, Bull. Torrey Bot. Club 30:119. 1903 (holotype, studied). — *Xanthochrous rudis* Pat., Bull. Soc. Mycol. France 23:83. 1907 (holotype, studied).

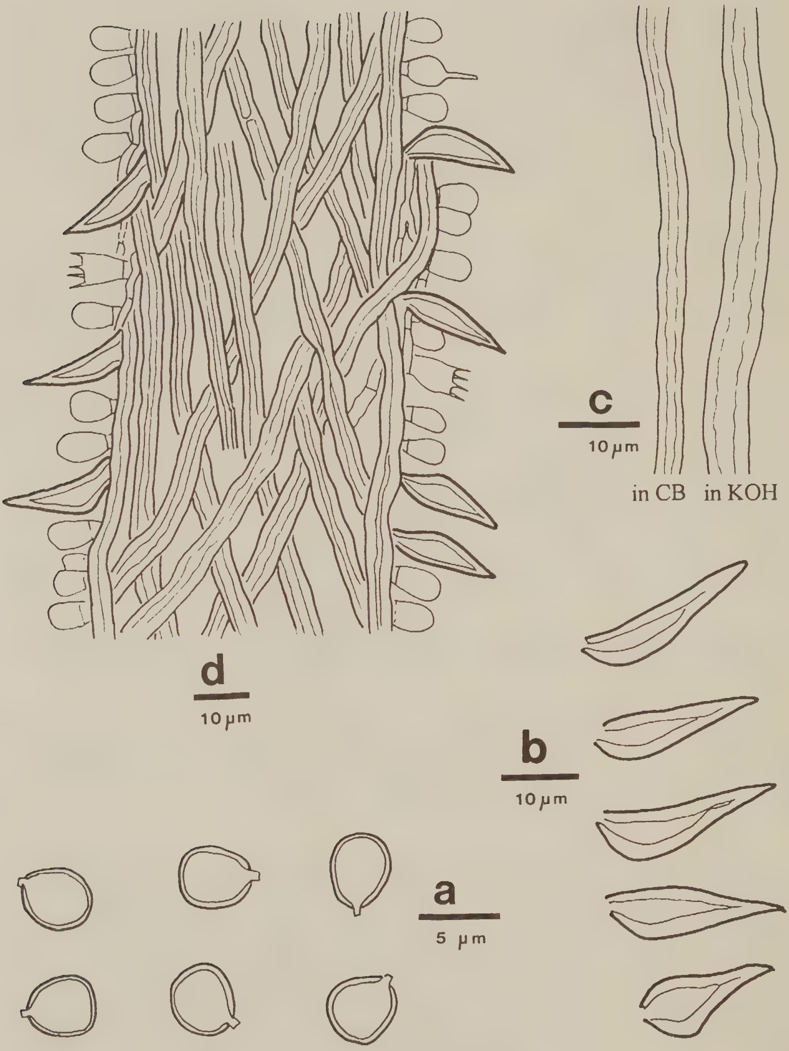
Basidiocarps perennial, dimidiate, woody hard; upper surface dark brown, matted-tomentose, concentrically zonate, shallowly sulcate; edge more or less acute; poroid surface brown to dull brown, sterile margin very narrow to indistinct, yellowish brown, pores circular, 6–8(–9) per mm (n=120/4), dissepiments thin to fairly thick, entire. Context brown to dull brown, woody hard, up to 1 cm thick, somewhat radially fibrous and lustrous, a thin black line present between upper matted tomentum and context in the type, the black line becoming thick and forming a black crust in old basidiocarps. Tubes dull brown, up to 1.5 cm long, tube layers indistinct.

Hyphal system monomitic in context, dimitic in trama; all septa without clamp connections; tissue darkening and hyphae becoming swollen in KOH.

Context. — Contextual hyphae varying from hyaline and thin-walled to golden yellow and fairly thick-walled, lumen significantly wider than walls, all the hyphae frequently simple-septate, regularly arranged, (3.9–)4.2–5.3(–6) µm (n=60/2), (4.8–)5–6.8(–7) µm in KOH (n=60/2).

Tubes. — Trama dominated by skeletal hyphae, all hyphae loosely interwoven. Generative hyphae hyaline, thin- to slightly thick-walled, branched, CB+, (2–)2.1–3.1(–3.5) µm (n=31/1); skeletal hyphae yellowish brown, thick-walled, usually bearing a distinct lumen, occasionally simple-septate, unbranched, 3–4(–4.8) µm (n=90/3), (3.9–)4.4–5.8(–6) µm in KOH (n=90/3). Hymenial setae frequent, thick-walled, ventricose, (15–)16–29(–33) × 5–8(–10) µm (n=130/4). Fusoid cystidioles and rhomboid crystals occasionally present. Basidia narrowly barrel-shaped to clavate, with four sterigmata, 8–14 × 4.5–6 µm (n=17/2); basidioles in shape similar to basidia, but slightly smaller.

Spores. — Basidiospores basicly subglobose, fairly thick-walled and CB+ in juvenile stage, mature spores thick-walled, yellowish brown, IKI–, CB–, (4–)4.3–5.5(–6) × (3.5–)3.8–4.8(–5) µm, L = 4.96 µm, W = 4.24 µm, Q = 1.13–1.21 (n=180/5).


c
10 μm
in CB
in KOH
d
10 μm
b
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a
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Fig. 2. Microscopic structures of *Phellinus linteus* (Berk. & M.A. Curtis) Teng (drawn from holotype).—a) spores, —b) setae, —c) tramal skeletal hyphae, —d) a vertical section through trama.

Distribution and hosts. — Very little can be said about the distribution and host of *Phellinus linteus*. It has been reported from tropical America (Lowe, 1957). Teng (1963) combined the fungus in the genus *Phellinus* Quél. based on the Chinese material, but these collections actually represent *P. baumii*. *Xanthochrous rudis* was described from the Mali (Patouillard, 1907), Ryvarden (1983) and Larsen and Cobb-Poulle (1990) merged it into synonymy of *P. linteus*. The type of *X. rudis* was studied, and we confirm that *P. linteus* occurs in Africa.

Specimens studied. — **Costa Rica**. Saula, Rosa, 65–79 (O). **Mexico**. Oaxaca, Huajuapan de León, 29.X.1974 *Durarte 2* (O); Yucatan, 1898 *Millspaugh* (NY 57792, holotype of *Pyropolyporus yucatanensis*). **Nicaragua**. *Wright* (K, holotype). **[Mali]**. 'sur Yao, Maijirgui', 17.V.1906 *Chudea* (FH, holotype of *Xanthochrous rudis*).

COMPARISON

Phellinus baumii and *P. linteus* share the following characters: sulcate upper surface, small pores, monomitic structure in context and dimitic in trama, ventricose setae, and fairly thick-walled and yellowish spores.

The important differences between *Phellinus baumii* and *P. linteus* are summarized in Table 1. In addition to the listed characters, *P. baumii* has a blunt edge, a distinct sterile zone bordering the poroid surface, and a receding tube layer in old fruitbodies; in *P. linteus* the margin is more or less acute, the sterile zone is very narrow to indistinct, and the living poroid area is not receding.

Table 1. A comparison of *Phellinus baumii* Pilát and *P. linteus* (Berk. & M.A. Curtis) Teng, based on specimens from Asia, Central America and Africa

	Phellinus baumii	*Phellinus linteus*
Spores	broadly ellipsoid 3.3–4.5 × 2.4–3.5 µm L=3.91 µm, W=2.99 µm Q=1.23–1.40 (n=420/14)	subglobose 4.3–5.5 × 3.8–4.8 µm L=4.96 µm, W=4.24 µm Q=1.13–1.21 (n=180/5)
Tramal skeletals	2.1–3.1 µm in diam in CB 2.6–3.1 µm in diam in KOH	3–4 µm in CB 4.4–5.8 µm in KOH
Contextual thick-walled hyphae	4.2–6 µm in CB 4.6–6 µm in CB	4.2–5.3 µm in CB 5–6.8 µm in KOH
Setae	14–24 × 5–9 µm	16–29 × 5–8 µm

SOME RELATED TAXA

Fomes ajazii Hussain was published from Pakistan (Hussain, 1952); after studying its material from type locality Lowe (1957) considered it to be the same as *Phellinus linteus*. Larsen and Cobb-Poulle (1991) suspected Lowe's conclusion because *F. ajazii* has smaller spores than those in *P. linteus*. We did not study the type of *F. ajazii*, but according to its description it fits *P. baumii* very well.

The type of *Phellinus microcystideus* K.A. Harrison & Pat. (from the Republic of Congo) and a Tanzanian collection were studied, and they are conspecific. The two specimens have similar spores and hyphal structure as in *P. linteus*. However, the setae of the African material (16–32 × 8–13 µm) are wider than those in *P. linteus* (16–29 ×5–8 µm), and the shape of the setae differs from *P. linteus*, too. So another taxon may exist in Africa. Ryvarden and Johansen (1980) reported *Phellinus linteus* in East Africa, and pointed out that the African material has more acute setae than American collections. Harjula (1980:75) reported that the fungus is used by traditional healers as medicine to cure headache in Tanzania.

Phellinus dependens (Murrill) Imazeki has similar pores and spores as those of *P. baumii*, but it has a more or less pendant habit, and its context is distinctly dimitic. Skeletals are dominant in context, thick-walled to nearly solid, nonseptate, and narrower (3–4 µm in diam) than in *P. baumii* (4.2–6 µm).

Specimens studied. — *Phellinus dependens*. **Cuba**. Alto Cedro, angiosperm, III.1903 *Underwood & Earle 1508* (NY, holotype). — *Phellinus microcystideus*. **Congo**, *Chevalier* (FH, holotype). **Tanzania**, Arusha, *Olea*, 1976 *Harjula* (H).

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NEW COMBINATIONS IN PARMELIOID GENERA (ASCOMYCOTINA: PARMELIACEAE)

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ABSTRACT: In preparation for updating Mason E. Hale's "List of Epithets in the Parmelioid Genera," we have identified 27 species epithets that need transfer into generic segregates from *Parmelia s. lato*. Most of these epithets were retained in *Parmelia* when other members of their groups were transferred into one of the more than thirty generic segregates described or resurrected in the past twenty-five years. New combinations are proposed in ten genera of the lichen family Parmeliaceae: *Flavoparmelia*, *Hypotrachyna*, *Myelochroa*, *Neofuscelia*, *Paraparmelia*, *Parmelinopsis*, *Parmeliopsis*, *Parmotrema*, *Punctelia*, and *Rimeliella*.

In June 1989 Mason E. Hale, Jr. (1928-1990) distributed to many of his lichenological colleagues a preliminary "List of Epithets in the Parmelioid Genera" (US!). The list included over 2,000 epithets of *Parmelia* Ach. or its generic segregates. The epithets, arranged alphabetically, provided a summary of the dispersions of the species among the 34 segregate genera and *Parmelia* s. str. Although some of these dispersions produced novel combinations, it is clear that Hale did not intend to validate these combinations by means of this list. Even if distribution of the list could be argued as effectively published, the combinations could not be considered validly published since they lacked basionym citations. Instead Hale used the preliminary list to informally share his thoughts on classification of parmelioid lichens with his colleagues.

Hale's list has been a valuable reference in locating species among the different schemes of classification currently in use in publications and in herbaria. As part of our efforts to update, edit, and electronically publish this important list, we have identified more than twenty species names that are informally filed with segregate genera, but that were never formally combined. Some of their basionyms, *Parmelia dictyoidea* Hue, *P. helenae* de Lesd., *P. hypomiltoides* Vain., *P. internexa* Nyl., *P. rupta* Lynge, and *P. subcapitata* Nyl. ex Hasse were originally published more than fifty years ago, and doubtless were discovered during Mason Hale's search for overlooked names and types. Others indicate a rethinking of their relationships since they had been placed in generic segregates of *Parmelia* — *Omphalodium mazoense* C.W.Dodge, *Parmelina crenulata* (J.D.Zhao) J.C.Wei, *Parmotrema larense* López-Fig., *Parmotrema reitzii* Hale, *Pseudoparmelia leucoxantha* (Müll.Arg.) Hale, *Pseudoparmelia venezolana* Hale, and

Xanthoparmelia lividica Hale— but are now transferred to other genera of Parmeliaceae. Other names were published under the genus *Parmelia* during the two decades when Hale and his colleagues were actively describing the segregate genera.

To resolve the nomenclature of these names according to Hale's classification scheme we are validating or making the required combinations here. Fifteen names validated here are attributed to Hale since he used the combinations in his unpublished lists and correspondence or on herbarium labels. The authorities for these combinations can be cited as "Hale ex DePriest & B.Hale." Two others, based on *Xanthoparmelia lividica* Hale and *Pseudoparmelia venezolana* Hale, were discussed by Hale in either publications or correspondence but without constructing the genus-species combination. Therefore, these names represent the intentions of Hale but, since he never coined them, cannot be attributed to him. Seven of the basionyms were published by S.Kurokawa or F.Brusse concurrent with or immediately after preparation and distribution of Hale's unpublished *List of Epithets in the Parmelioid Genera* and, most likely, the publications were not available to Hale for inclusion. However, on the basis of the original publications, these species can be placed easily into Hale's generic classification scheme.

J.A.Elix and A.Fletcher have permitted us to publish here their combinations in the genera *Parmeliopsis* and *Rimeliella*, respectively, to make those names available for distribution in the updated list. Those combinations are to be solely attributed to the individual authors. We note that the two *Rimeliella* taxa recently have been transferred into *Canomaculina* (Elix 1997). *Parmelia helenae* de Lesd. is considered of uncertain application by some lichen systematists since the type material is insufficient to resolve its taxonomic relationships with *Punctelia perreticulata* (Räsänen) G. Wilh. & Ladd and *P. subrudecta* (Nyl.) Krog on the basis of conidial characters (T.Ahti, pers. comm.). It is transferred here since this species was accepted by Hale. In all of these combinations we have tried to reflect Mason Hale's taxonomic and nomenclatural conclusions in the parmelioid genera.

Flavoparmelia leucoxantha (Müll.Arg.) Hale ex DePriest & B.Hale, comb. nov.
Basionym: *Parmelia leucoxantha* Müll.Arg., Flora 64: 85. 1881.
≡ *Pseudoparmelia leucoxantha* (Müll.Arg.) Hale, Phytologia 29: 190. 1974.
Remarks: Hale used the name *Flavoparmelia leucoxantha* in his unpublished *List of Epithets in the Parmelioid Genera*.

Flavoparmelia subcapitata (Nyl. ex Hasse) Hale ex DePriest & B.Hale, comb. nov.
Basionym: *Parmelia subcapitata* Nyl. ex Hasse in Contr. US. Natl. Herb. 17: 103. 1913.
Remarks: Hale used the name *Flavoparmelia subcapitata* in unpublished correspondence to J. A. Elix dated 20 November 1987 (US!).

Hypotrachyna quaesita (Kurok.) DePriest & B.Hale, comb. nov.
Basionym: *Parmelia quaesita* Kurok., Ann. Tsukuba Bot. Gard. 5: 4. 1986.
Remarks: This species was placed under *Parmelia* section *Hypotrachyna* Vain. in the original publication.

Hypotrachyna woitapensis (Kurok.) DePriest & B.Hale, comb. nov.
Basionym: *Parmelia woitapensis* Kurok., Ann. Tsukuba Bot. Gard. 5: 7. 1986.
Remarks: This species was placed under *Parmelia* section *Hypotrachyna* Vain. in the original publication.

Myelochroa crenulata (J.D.Zhao) Hale ex DePriest & B.Hale, comb. nov.
Basionym: *Parmelia crenulata* J.D.Zhao, Acta Phytotax. Sin. 9 (2): 150. 1964.

≡ *Parmelina crenulata* (J.D.Zhao) J.C.Wei, An Enumeration of Lichens in China 173. 1991.
Remarks: Hale used the name *Myelochroa crenulata* in his unpublished *List of Epithets in the Parmelioid Genera.*

Neofuscelia barda (Brusse) DePriest & B.Hale, comb. nov.
Basionym: *Parmelia barda* Brusse, Bothalia 17: 25. 1987.
Remarks: This species was placed in *Parmelia* section *Neofusca* in the original publication.

Neofuscelia princeps (Brusse) DePriest & B.Hale, comb. nov.
Basionym: *Parmelia princeps* Brusse, Bothalia 17: 27. 1987.
Remarks: This species was placed in *Parmelia* section *Neofusca* in the original publication.

Paraparmelia lividica (Hale) DePriest & B.Hale, comb. nov.
Basionym: *Xanthoparmelia lividica* Hale, Mycotaxon 27: 584. 1986.
Remarks: Hale (1990b: 232) excluded this species from *Xanthoparmelia*: "This is a *Paraparmelia*, there being no usnic acid in the cortex."

Parmelinopsis britannica (D.Hawksw. & P.James) J. A. Elix, comb. nov.
Basionym: *Parmelia britannica* D.Hawksw. & P.James, in Vezda, Lichenes Selecti Exsiccati No. 1164. 1973.
Remarks: Although Hale placed *P. britannica* in the genus *Hypotrachyna* in sched. (US), the species has rhizines and cilia characteristics of the related genus *Parmelinopsis* (Elix, pers. comm.). Elix notes that the rhizines are for the most part simple, but occasionally furcately branched, and the lobe margins have somewhat regularly dispersed, inconspicuous cilia that are short (to 0.2 mm), simple, and black in color. Chemically and morphologically this species appears closely related to *Parmelinopsis afrorevoluta* (Krog & Swinscow) Elix & Hale.

Parmelinopsis ectypa (Brusse) DePriest & B.Hale, comb. nov.
Basionym: *Parmelia ectypa* Brusse, Mycotaxon 42: 164. 1991.
Remarks: This species was compared to species of *Parmelinopsis* in the original publication.

Parmeliopsis venezolana (Hale) DePriest & B.Hale, comb. nov.
Basionym: *Pseudoparmelia venezolana* Hale, Smithsonian Contr. Bot. 31: 55. 1976.
Remarks: This species was compared to *Parmeliopsis* in the original publication, and referred to that genus correspondence from J. A. Elix to Hale dated 10 October 1985 (US!): "Consequently your [Hale's] original suspicions that this may in fact be a *Parmeliopsis* species are probably well founded."

Parmotrema cryptoxanthoides (Kurok.) Hale ex DePriest & B.Hale, comb. nov.
Basionym: *Parmelia cryptoxanthoides* Kurok., Bull. Natl. Sci. Mus. 17 (4): 297. 1974.
Remarks: Hale used the name *Parmotrema cryptoxanthoides*, in sched. (US). This species was placed in *Parmelia* subgenus *Amphigymnia* in the original publication.

Parmotrema erhizinosum (D.D.Awasthi) Hale ex DePriest & B.Hale, comb. nov.
Basionym: *Parmelia erhizinosa* D.D.Awasthi, Biol. Mem. 1 (1&2): 208. 1976.
Remarks: Hale used the name *Parmotrema erhizinosum* in his unpublished

research notes (US). This species was placed in *Parmelia* subgenus *Amphigymnia* in the original publication.

Parmotrema exquisitum (Kurok.) DePriest & B.Hale, comb. nov.
Basionym: *Parmelia exquisita* Kurok., Bull. Natl. Sci. Mus. Ser. B, 13 (1): 11. 1987.
Remarks: This species was placed in *Parmelia* subgenus *Amphigymnia* in the original publication.

Parmotrema hypomiltoides (Vain.) Hale ex DePriest & B.Hale, comb. nov.
Basionym: *Parmelia hypomiltoides* Vain., Acta Soc. Fauna Fl. Fenn. 7 (7): 35. 1890.
- [*Parmotrema hypomiltoides* (Vain.) Hale in López Figueiras (1986: 335) and Hale (1990a: 109), nom. inval. (no basionym cited, ICBN Art. #33).]
Remarks: Hale used the name *Parmotrema hypomiltoides*, at that time nom. inval., in his unpublished *List of Epithets in the Parmelioid Genera*, but we can find no evidence that the name was validly published.

Parmotrema internexum (Nyl.) Hale ex DePriest & B.Hale, comb. nov.
Basionym: *Parmelia internexa* Nyl., Flora 68: 609. 1885.
Remarks: Hale used the name *Parmotrema internexum* in his unpublished *List of Epithets in the Parmelioid Genera*. This species was placed in *Parmelia* subgenus *Amphigymnia* in the original publication.

Parmotrema matudae (Kurok.) Hale ex DePriest & B.Hale, comb. nov.
Basionym: *Parmelia matudae* Kurok., J. Jap. Bot. 59 (7): 194. 1984.
Remarks: Hale used the name *Parmotrema matudae* in his unpublished research notes (US). This species was placed in *Parmelia* subgenus *Amphigymnia* in the original publication.

Parmotrema mazoense (C.W.Dodge) Hale ex DePriest & B.Hale, comb. nov.
Basionym: *Omphalodium mazoense* C.W.Dodge, Ann. Missouri Bot. Gard. 46: 192. 1959.
Remarks: Hale used the name *Parmotrema mazoense* in his unpublished *List of Epithets in the Parmelioid Genera.*

Parmotrema nanfongense (Kurok.) DePriest & B.Hale, comb. nov.
Basionym: *Parmelia nanfongensis* Kurok., Bull. Natl. Sci. Mus. Sér. B, 13 (1): 12. 1987.
Remarks: This species was placed in *Parmelia* subgenus *Amphigymnia* in the original publication.

Parmotrema ruptum (Lynge) Hale ex DePriest & B.Hale, comb. nov.
Basionym: *Parmelia rupta* Lynge, Ark. Bot. 13 (13): 40. 1914.
Remarks: Hale used the name *Parmotrema ruptum* in his unpublished *List of Epithets in the Parmelioid Genera* and in sched (US).

Parmotrema spinibarbe (Kurok.) Hale ex DePriest & B.Hale, comb. nov.
Basionym: *Parmelia spinibarbis* Kurok., Bull. Natl. Sci. Mus. 17 (4): 299. 1974.
≡ *Canomaculina spinibarbis* (Kurok.) Elix, Mycotaxon (in press). 1997.
Remarks: Hale used the name *Parmotrema spinibarbe* in his unpublished *List of Epithets in the Parmelioid Genera*. This species was placed in *Parmelia* subgenus *Amphigymnia* in the original publication.

Parmotrema stenopteris (Kurok.) Hale ex DePriest & B.Hale, comb. nov.
Basionym: *Parmelia stenopteris* Kurok., Annual Rep. Noto Mar. Lab. 13: 75. 1973.
Remarks: Hale used the name *Parmotrema stenopteris* (as '*stenoptere*') in his unpublished *List of Epithets in the Parmelioid Genera.* This species was placed in *Parmelia* subgenus *Amphigymnia* in the original publication.

Punctelia dictyoidea (Hue) Hale ex DePriest & B.Hale, comb. nov.
Basionym: *Parmelia dictyoidea* Hue, Nouv. Arch. Mus. Hist. Nat. Ser. 4, 1: 154. 1899.
Remarks: Hale used the name *Punctelia dictyoidea* (as '*dictyoides*') in his unpublished *List of Epithets in the Parmelioid Genera.*

Punctelia helenae (de Lesd.) Hale ex DePriest & B.Hale, comb. nov.
Basionym: *Parmelia helenae* de Lesd., Bull. Soc. Bot. France 84: 283. 1937.
Remarks: Hale used the name *Punctelia helenae* in his unpublished *List of Epithets in the Parmelioid Genera.* This species was compared in original publication to species currently placed in the genus *Punctelia.* The basionym was considered a synonym of *Punctelia subrudecta* by Krog (1982: 291).

Punctelia roystonea (Vicente & L.Xavier) Hale ex DePriest & B.Hale, comb. nov.
Basionym: *Parmelia roystonea* Vicente & L.Xavier, Rev. Bryol. Lichénol. 45 (4): 474. 1979.
Remarks: Hale used the name *Punctelia roystonea* in his unpublished *List of Epithets in the Parmelioid Genera.* The species was compared to species of *Punctelia* in original publication.

Rimeliella larensis (López-Fig.) A.Fletcher, comb. nov.
Basionym: *Parmotrema larense* López-Fig., Phytologia 44(2): 89. 1979.
≡ *Canomaculina larensis* (López-Fig.) Elix, Mycotaxon (in press). 1997.
Remarks: Hale placed this species in a genus that is, and will remain, unpublished. (We refrain from using this herbarium name in print, however, so as not to create a "pro syn.")

Rimeliella reitzii (Hale) A.Fletcher, comb. nov.
Basionym: *Parmotrema reitzii* Hale, Mycotaxon 5(2): 439. 1977.
≡ *Canomaculina reitzii* (Hale) Elix, Mycotaxon (in press).
Remarks: Hale placed this species in a genus that is unpublished, as described above. The basionym was considered a synonym of *Rimeliella conferenda* (Hale) Kurok. by Kurokawa (1991: 4).

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Krog, H. 1982. *Punctelia*, a new lichen genus in the Parmeliaceae. Nord. J. Bot. 2: 287-292.

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A VALIDATED SPECIES AND A NEW COMBINATION IN *PARMOTREMA* (ASCOMYCOTINA: PARMELIACEAE)

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ABSTRACT: We have identified two nomenclatural problems in the genus *Parmotrema*. The name *Parmotrema incrassatum* Hale was invalidly published since it lacked both a Latin description and type designation, and *Parmotrema michauxianum* (Zahlbr.) Hale is a synonym since there is an earlier epithet available for that species. We provide validation of the first species and a new combination for the second to resolve these nomenclatural issues.

In 1989, Mason E. Hale, Jr. (1928-1990) informally circulated a "List of Epithets in the Parmelioid Genera" to many of his colleagues. In preparation for publication and electronic distribution of this list of approximately 2,000 epithets, we discovered that a few of the names were either unpublished, invalidly published, or incorrect. Although most of these nomenclatural issues could be resolved by new combinations (DePriest & B. Hale 1998), two required more research and explanation. To resolve the nomenclature of these names according to Hale's classification scheme we are validating a species name for Hale and making a required combination here.

Parmotrema incrassatum Hale, sp. nov.

Thallus 5-8 cm latus, lobis 3-6 mm latis elaciniatis; superficie superior continua; cilia nulla; isidia cylindrica; superficie inferior nigra margine castanea. Apothecia nulla. Conidia non visa.

The Latin discription is based on the following species description by Hale (US!): Thallus 5-8 cm in diameter; lobes 3-6 mm wide, laciniae lacking; upper surface continuous, cilia lacking; isidia present, cylindrical; lower surface black, marginal rim brown. Apothecia lacking. Conidia not seen.

Type: Hong Kong. Soko Island. On granite boulders along the shore on north side of island, 1 June 1975, *Stella L. Thrower 2220* (holotype US).

Additonal Specimens: Hong Kong. Soko Island. On granite boulders on the northern beach, in the splash zone, northern Soko Island, 1 June 1975, *Stella L. Thrower 2218* (US); Hong Kong. Po Toi Island, N. T. On granite boulder on hillside, 31 August 1975, *Stella L. Thrower 2288* (US).

Chemistry: Atranorin and protocetraric acid present.

Remarks: The name "*Parmotrema incrassatum*" was inadvertently published and attributed to Hale by Thrower (1988: 128 & cover photograph). Thrower's use of the name was invalid since it lacked both a Latin description and a designated type. Although Hale had annotated three specimens in the United States National Herbarium with this name as early as 1977, to our knowledge the name had never been validly published nor a type choosen. To validate this name we provide the required Latin description and designate a holotype from specimens in the United States National Herbarium that were annotated by Hale. Since the Latin description was prepared directly from an English language description of the species in Hale's unpublished *Parmatrema* database, the species name can be attributed to Hale.

Thrower (1988) described this ashy-gray species as having distinctive and abundant isidia. The isidia, which are globular to cylindrical or coralloid, are either submarginal (about 5 mm from the margins) or laminal along cracks near the thallus center. Thrower (1988) compared the species to *P. tinctorum*, from which it differs in smaller size of lobes, pattern of isidia, and chemistry. However, Hale (in correspondence to Thrower, 25 June 1982) suggested this species had a close affinity to *P. saccatilobum* (Tayl.) Hale, "which has much thinner isidia."

Parmotrema submarginale (Michx.) DePriest & B. Hale, comb. nov.
Basionym: *Lobaria submarginalis* Michx., Fl. Bor.-Amer. 2: 325. 1803.
≡ *Parmelia submarginalis* (Michx.) Ach., Lichenogr. Universalis: 464. 1810. nom. illegit, non (Wulfen) Ach. 1803.
≡ *Parmelia michauxiana* Zahlbr., Cat. Lich. Univ. 6: 244. 1929.
≡ *Parmotrema michauxianum* (Zahlbr.) Hale, Phytologia 28: 337. 1974.

Remarks: The name *Parmotrema michauxianum* (Zahlbr.) Hale is used for a species that is widely distributed in the eastern United States. This combination is based on *Parmelia michauxiana* Zahlbr., which was a renaming of *Parmelia submarginalis* (Michx.) Ach. Zahlbruckner (1925: 97, 1929: 244, 258) recognized the latter name as illegitimate since it was a later honomym of *Parmelia submarginalis* (Wulfen) Ach. (1803: 246) — a name based on *Lichen submarginalis* Wulfen in Jacq. (1789: 132) and synonymized with *Collema submarginalis* (Wulfen) Ach. (1810: 653). Zahlbruckner, in supplying the new name *Parmelia michauxiana* Zahlbr., clearly indicated that it was based on *Lobaria submarginalis* Michx. Hale used the name *Parmelia michauxiana* Zahlbr., but excluded it from *P.* subgenus *Amphigymnia* (Hale 1965: 349) and placed it in the keys for *P.* subgenus *Parmelia* subsection *Imbricaria* (Hale & Kurokawa 1964: 132). However, when resurrecting the genus *Parmotrema* A. Mass. (1860: 248) for subgenus *Amphigymnia*, Hale (1974) published *Parmotrema michauxianum* (Zahlbr.) Hale. In fact, the epithet *submarginalis* was (and still is) available for use in *Parmotrema*. Since the species is based on *Lobaria submarginalis* Michx. the correct name is *Parmotrema submarginale.*

ACKNOWLEDGMENTS

We thank Harold Robinson for his continuous encouragement of this project and assistance with the Latin description, Dan Nicolson for insightful comments on nomenclature, and Jack Elix, Christian Feuillet and John Pruski for their helpful reviews of this manuscript. This work is based on research notes and computer databases prepared by Mason E. Hale, Jr., which are housed in the United States National Herbarium and the Department of Botany, National Museum of Natural History, Smithsonian Institution.

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A *GYMNOPILUS* ON PONDCYPRESS BARK IN FLORIDA

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ABSTRACT

This is the first report of *Gymnopilus fulgens* from the Southern United States. The habitat on moss covered bark of live pondcypress bark is also an unreported substrate and plant community.

Key Words: pondcypress, Cortinariaceae, *Gymnopilus*, Florida.

INTRODUCTION

During the course of an ecological study on an impact site on the Tosohatchee State Reserve in Orange County , Florida, a small agaric was observed in a declining stand of pondcypress fruiting abundantly on moss-covered bark near the base of pondcypress (*Taxodium ascendens* Brongn.) trees. The depressional wetland near Christmas, Florida, where the agaric was discovered, was part of an ecological study by the University of Georgia to determine the cause of the wetland decline at the State Reserve. Fresh material was collected and sent by Federal Express to the senior author in February 1993. A fresh description was made at that time and a spore print obtained. When this species was first investigated it had the aspect of a *Galerina* and is actually very similar to *Galerina pallidspora* Smith (Smith, 1953; Smith & Singer, 1964 p.123). The range extension from alder logs on the Olympic Peninsula to pondcypress trees in Florida was large but not unusual for many decomposers. *Galerina pallidspora* fruits during cool weather in May in Washington and the taxon under study fruits in February in Florida. The spore color and morphology, however, was not that of a *Galerina.*

Since *Galerina* was not a good fit in several ways, it was possible that this species could have a counterpart in Europe. Therefore specimens and notes were sent to Dr. Egon Horak for his examination. He placed the fungus in the genus *Gymnopilus* for the following reasons. The spore print is a dark rusty brown and the coarsely warted spores lack a true plage and germ pore. The basidiome is a bit too robust and the pileipellis hyphae strongly incrusted. In addition, he noticed that the tissue sectioned in KOH exuded a "yellowish or pale yellow plasmatic pigment unknown from any *Galerina* but a common feature of *Gymnopilus".* However, though he felt that it all pointed toward an unusual species of *Gymnopilus*, Dr. Horak suggested that Prof./Dr. M. Moser might know the species. During a recent sabbatical at the Universitat Innsbruck by one of us (OKM) the material and data were reviewed with Prof. Moser and after some discussion he suggested that the nearest taxon in Europe appeared to be *G. fulgens* (Favre & Maire) Singer. The description of the fungus by Favre & Maire (1937) and the description and painting by Favre (1958), illustrating the species, fits our fungus very closely. Dr. Moser indicated that when he first encountered this taxon he assumed that it was a *Galerina* and did not, at first, recognize the species as a *Gymnopilus*t. It is most often encountered in *Sphagnum* or among other mosses in burned areas and not often directly on wood as is the case with most species of *Gymnopilus*. Several collections of *Gymnopilus fulgens* were studied from collections made in Europe by Dr. Moser and Dr. Roy Watling. The spores of our Florida material were studied and compared with European collections. A random sample of 31 spores from Moser 79/584 yielded spores 8.2-18.5x5.6-7.3 µm , E_m = 1.5 (E 1.3-1.6), n = 31. A random sample of spores from a spore print of OKM 25515 from Florida yielded spores 9.0-11.2x5.8-7.0 µm, E_m = 1.6 (E 1.4-1.8) . Subsequent examination of additional European collections by Moser (82/182), and Watling (18507 and 24437) reveals very similar ranges and E_m. values. The spore size given and illustrated for the holotype by Favre and Maire (1937) was 8-11x5-7 µm and was indicated in the Latin diagnosis as "ovoides-subglobuleuses, 8.5-9.5 x 6.0-7,5" by the authors. The physical appearance of the specimens is very close and the micro morphology is nearly identical with very similar cystidia, pileipellis features, etc. There all appear to be the same taxon. Several collections from the material cited by Hesler in his monograph from North America (Hesler, 1969) were requested on loan and examined for spore morphology and other microanatomy. They all appear to be *Gymnopilus fulgens* with one exception which should referred to *Galerina* and is indicated below under Observations.

The colour standard used was Kornerup and Wanscher (1978). The colour, for example, indicated by (p8D6-7) refers to page 8, row D, block numbers 6 and 7. Microscopic examination was carried out using 3% KOH and Melzer's solution..

TAXONOMY

Gymnopilus fulgens (Favre & R.Maire) Sing. Figs. 1-4.

Pileus 2-3.4 cm broad, convex young to broadly convex with an obscure umbo in some in age, dry to moist but not viscid, not or very slowly hygrophanous, minutely radially grooved, evenly red-brown, (p8D6-7 to p8C6-7). **Lamellae** adnate, subdistant, broad, two tiers of lamellulae, (long alternate with short), orange at first (p7B6) to orange-brown (p7C5-6) in age. **Stipe** 2.2-3.6 cm long, 2-3mm broad, somewhat flexuous, glabrous, concolorous with pileus except near the sightly enlarged base which is lighter with fine appressed pale fibrils, near apex are scattered fibrils which may be the light brown scattered remains of a very thin partial veil. **Context** pale buff to pinkish buff in pileus and soft center of the stipe, rest of stipe dark red-brown.

Pileipellis a mixocutis, densely interwoven hyphae, thin-walled, 5.3-18.0 µm diam, with some surface encrustations, simple septate, with scattered clamp connections, deep reddish brown in 3% KOH. **Pileitrama** of loosely interwoven hyphae, 4.5-20.0 µm diam, with scattered clamp connections, thin-walled, hyaline in 3% KOH. **Lamellar trama** parallel, large often swollen cells 5-18µm diam., thin-walled, with scattered clamps, hyaline in 3% KOH. **Cheilocystidia** 19.5-31 x 2.6-10 µm with neck 2.5-3µm wide, primarily lecythiform, occasionally with a narrow, attenuated apex, or a narrow, attenuated supcapitate apex, thin-walled, hyaline in 3% KOH. **Basidia** 27-30x 6.7-8.9µm narrowly clavate, thin-walled 4-spored, hyaline in 3%KOH. **Basidiospores** 9-11.2x5.8-7.0 µm ($E = 1.4\text{-}1.8$, $E_m = 1.6$) elliptic to short elliptic in profile and face view, distinctly warty, with a hyaline apiculus, dark red-brown in 3% KOH.

Habit, habitat and distribution: growing from the bark and wood near the base of living pondcypress (*Taxodium ascendens* Brongn.) trees in a depressional wetland at the Tosohatchee State Reserve, Orange Co., Christmas, Florida (28^0 30' 19", 80^0 59' 23"). Fruiting occurs from December through March. In Michigan, however, the species fruits as early as May and has been recorded fruiting again in the fall, where it has been recorded on burned sphagnum and on burned debris on the ground.

Material examined: SCOTLAND: Dorsett: Studland, Nov. 17, 1958, Orton 1537 (E); Orkney: Flaughton Hill, Eday, Sept. 27, 1990, Wat. Herb. 24437 (E); Shetland: Skaw Whalsay, Sept. 10, 1985, Wat. Herb. 18507 (E). **SWITZERLAND:** St. Callen, Sept. 21, 1979 M. Moser 79/584 (IN), Westlich Ricken, Sept. 1, 1982, M. Moser 82/182(IN) **U.S.A.:** Florida: Christmas, Tosohatchee State Reserve., Feb. 22, 1993, Mike Rich OKM 25515 (VPI); Tosohatchee S. Res., March 28, 1993, Sydney Bacchus OKM 27040, (VPI). Michigan: Mud Lake Bog, May. 30, 1932, Davidson & A. H. Smith No.32-32 (MICH), Whitmore Lake June 15, 1932 (MICH) Whitmore Lake, June 15, 1932, A.H. Smith 989 cf. Galerina (MICH).

Observations: The species has a very *Galerina*-like aspect. However, the spore print is dark rust- brown, the spores coarsely warted but a germ pore and true plage are absent. SEM photos of the spores were used to confirm features of the spore wall. Fragments of the tissue prepared in KOH exude yellow pigment immediately which is unknown from any *Galerina*, (Horak, pers com) but common in *Gymnopilus*, the habit which is a little more robust than *Galerina,* and lamellae which are orange at first to orange-brown in age are typical of *Gymnopilus* and not *Galerina*. Gregarious basidioma growing on bark over the base of the Bald Cypress leave no doubt about the substrate. The unusual occurrence of fruiting on live trees for the Florida material may be due to the poor health of the trees. The condition of pondcypress trees in the depressional wetland at the Tesohatchee State Reserve is similar to that of pondcypress in other depressional wetlands throughout central Florida were excessive withdrawal of ground water from the Florida aquifer has occurred (Bacchus and Brook, 1996, Bacchus 1997).

The Michigan collections A.H. Smith 32-32 & 32-118 fit the European concept, in every way, as well as the Florida material described here. However, A.H. Smith 989 from Michigan has differently shaped spores with an obscure plage (Hesler, 1969). The very small and fragile sporocarps should be referred to *Galerina* and not *Gymnopilus.*

ACKNOWLEDGMENTS

The senior author would like to thank Prof./Dr. Meinhard Moser and Dr. Egon Horak for help and suggestions in the identification of *G. fulgens*. We would like to thank the curators at Innsbruck (IN), Edinburgh (E), and Ann Arbor (MICH) for the loan of specimens. Dr. Reinhold Pöder and Dr. Roy Watling kindly provided space and facilities during the visit of the senior author. Dr. Steven Miller kindly reviewed the manuscript.

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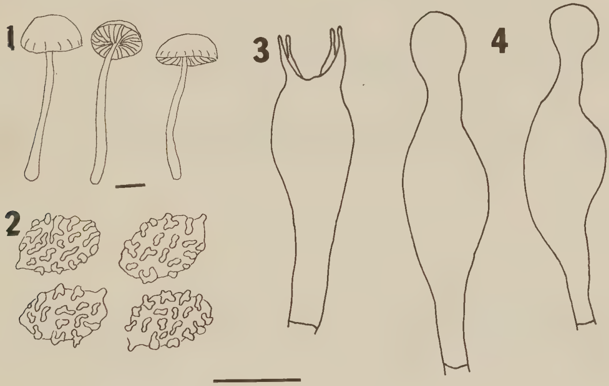

Gymnopilus fulgens Figs.1-4. 1. sporocarps. 2. basidiospores. 3. basidium. 4. pleurocystidia. Fig. 1. bar = 1 cm. Figs. 2-4. bar = 10 µm.

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SYZYGOSPORA NIVALIS SP. NOV. FROM TAIWAN*

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Abstract

A new *Syzygospora* species from Taiwan, *S. nivalis*, is described. It seems to be closely related to *S. alba* Martin which was redescribed and illustrated recently. Both are mycoparasites with zygoconidia and gyrose, whitish, gelatinous basidiocarps. *Syzygospora nivalis* is distinct, however, in having clavate probasidia, smaller conidiogenous cells, and swollen hyphae. No basidiocarps of host fungi were found with *S. alba*.

Key Words: *Syzygospora nivalis*, zygoconidia, mycoparasitism, ultrastructure, Taiwan.

The basidiocarps of *Syzygospora alba* (Martin, 1937) are morphologically very similar to most species of the genus *Tremella*. *Syzygospora* is characterized by the formation of paired and frequently fusing conidia. Boidin (1970) introduced the term "zygoconidium", and several mycologists have used the zygoconidial anamorphs for circumscribing *Syzygospora* (Carmichael et al., 1980; Eriksson and Ryvarden, 1973; Jülich and Stalpers, 1980; Kendrick and Watling 1979). Zygoconidia are also present in *Christiansenia pallida* Hauerslev (Hauerslev, 1969; Oberwinkler, et al. 1984), a resupinate mycoparasite on *Phanerochaete sordida* (P. Karst.) J. Eriksson & Ryvarden (=*Peniophora cremea* (Bres.) Sacc. & Syd.). *Christansenia pallida* had been placed tentatively in the Corticiaceae (Boidin, 1970; Eriksson and Ryvarden, 1973). Recently Roberts (1994) erected a new taxon, *Zygogloea gemellipara* P. Roberts, an auricularioid mycoparasite of *Myxarium nucleatum* also produces twinned zygoconidia. Kao (1956) elucidated nuclear behavior during conidium formation in *S. alba*. She found that the primary outgrowths of the conidiogenous cells are uninucleate, and after fusion, a dikaryotic conidium is formed. Oberwinkler and Bandoni (1982) revised *Syzygospora*, *Christiansenia*, and related taxa, proposing the Carcinomycetaceae for these fungi. Jülich (1982) erected the family Syzygosporaceae, including *Syzygospora* and *Christiansenia*. Ginns (1986) emended *Syzygospora* to include all known species of *Christiansenia* and *Carcinomyces*.

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* Part 158 in the series "Studies in Heterobasidiomycetes" from the Botanical Institute, University of Tübingen.

Materials and Methods

Syzygospora nivalis was collected at Tascheshan Forest Park, Taiwan, alt. 2000-2300 m, located on the border of Miaoli County and Taichung County, June 25th, 1996 by Chee- Jen Chen, No. CCJ 1427 (holotype).

Material was partly fixed in 2% glutaraldehyde and kept at 4 ℃, and partly dried immediately when collected. For transmission electron microscopy, fixed material was then post-fixed with 1% osmium tetroxide, washed with distilled water, stained in uranyl acetate solution, dehydrated in an actone series, and embedded in ERL according to Spurr (1969). Ultrathin sections were mounted on unsupported mesh copper grids, poststained in lead citrate solution, and examined in a Zeiss EM109 transmission electron microscope. Illustrations were prepared using a Zeiss Lab16 light microscope.

Results and Discussions

Syzygospora nivalis C.-J. Chen, F. Oberwinkler & Z.-C. Chen, sp. nov.

Fructificatio tremelloidea, gyrosa, cava, gelatinosa, alba, 0.5-2 cm. Probasidia et basidia clavata, basidia 45-100 x 6-7.5 µm, apicaliter raro partim longitudinaliter septata. Basidiosporae ovatae, 8-12.5 x 6-7 µm. Conidiophora cylindracea vel clavata, 6-9(-11) x 3-4.5 µm. Zygoconidia ellipsoidea vel ovata, 5-7.5(-9) x 3-4 µm, tenuiter tunicata.

Type: CCJ 1427
Etymology from Latin: nivalis, white, referring to basidiocarps.
Type locality: Tascheshan Forest Park, Taiwan, alt. 2000-2300 m, located on the border of Miaoli County and Taichung County.
Type deposited at NTU-TAI-Mycological Herbarium, Department of Botany, National Taiwan University, Taipei, Taiwan. R.O.C. (holotype); Universität Tübingen, Lehrstuhl Spezielle Botanik - Herbarium, Auf der Morgenstelle 1, D-72076 Tübingen, Germany (isotype).
Habitat: on decayed wood.

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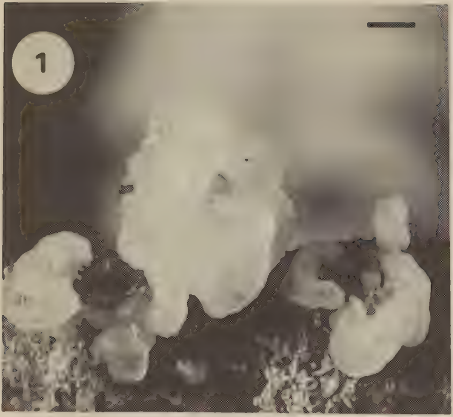
Fig. 1-6. *Syzygospora nivalis*. 1. Gelatinous and gyrose basidiocarps, bar=0.5 cm. 2. Conidiogenous cells and conidia, bar=10 µm. 3. Fused zygoconidium, bar=2 µm. 4. Two young individual conidia produced from conidiophore, bar=1 µm. 5. Conidiophore, bar=1 µm. Note conidia detached and simple septal pore. 6. Conidium, bar=0.5 µm. Note mononucleate conidiophorous cells and multilamellar scars.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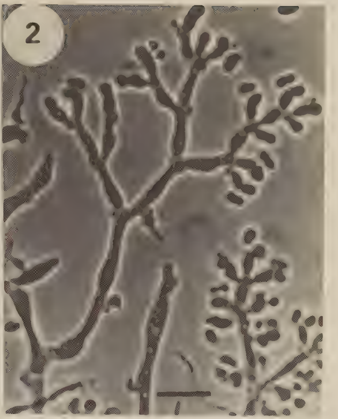
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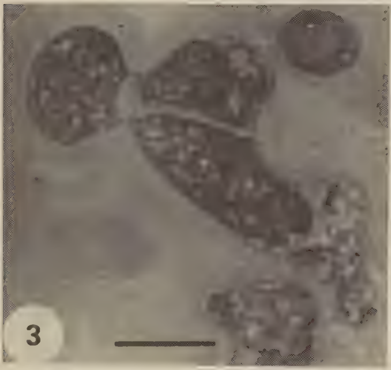
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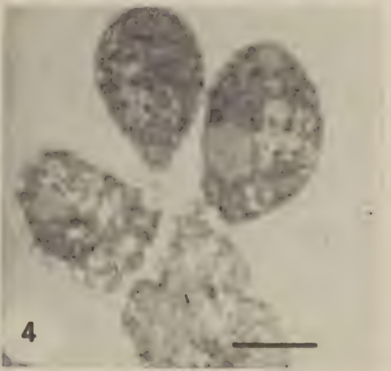
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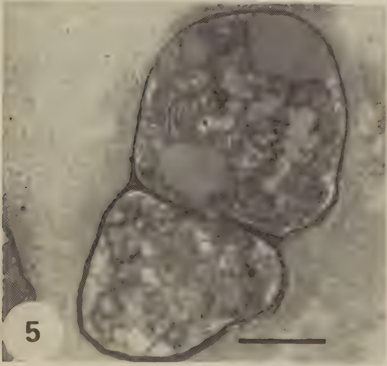
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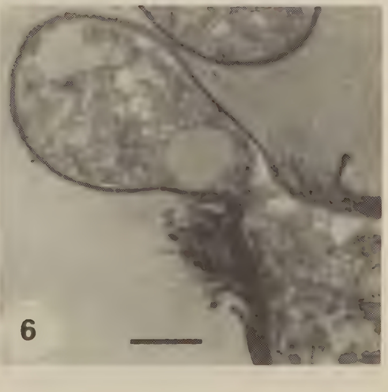
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Basidiocarps tremelloid and gyrose (Fig. 1), 0.5-2 cm ø, soft-gelatinous, hollow, white when young, cream to amber and brownish when old, with a dry to very tough and hard horny consistency. Basidia 45-100 x 6-7.5 µm, produced from probasidia (Fig. 13) swollen up to 11 µm ø, with mostly 2 or rarely 3 curved, stout sterigmata, bearing asymmetrically formed basidiospores, sometimes with partly longitudinally-septate apices. Probasidia pyriform (Fig. 13), mostly long stalked, rarely without stalks, frequently producing basidia from apical parts. Basidiospores oval (Fig. 14), 8-12.5 x 6-7 µm [Q** =1.33-1.43], hyaline, smooth. Conidiogenous cells (Fig. 2-5, 13 & 14), short, 6-9(-11) x 3-4.5 µm [Q=1.67-2.50], producing two terminal cells, mostly forming opposed, beak-like outgrowths simultaneously, then usually extending to globose conidia that fuse to form one-celled, thin-walled, dikaryotic conidia, finally detached. Conidia (Fig. 2, 4, 6, 13 &14) broadly ellipsoid to oval, 5-7.5(-9) x 3-4 µm [Q=1.25-2.5(-3.0)], thin-walled, hyaline. Sometimes monokaryotic conidia produced from another site of conidiogenous cells. Basidia produced abundantly on conidiogenous cells, covering the outer and inner surfaces of the basidiocarps. Hyphae thin-walled, hyaline, short, loosely branched, the branches commonly originating from clamps, 2-5 µm ø, frequently swollen close to septa (Fig. 2, 13 & 14), up to 8-10 µm ø in context and subhymenium. Haustoria short, normally narrow hyphae without branched outgrowths (Fig. 2, 7-8, 13-14), mainly produced from septa or swollen hyphae, clamped. Host cells intermixed with *Syzygospora* hyphae (Fig. 13), 2-5 µm ø, clamped. Host lacking basidiocarp.

Key for species with zygoconidia

1. Basidia auricularioid, parasite on *Myxarium nucleatum* ---------*Zygogloea gemellipara*
1'. Basidia homobasidiomyceteous, clavate, sometimes with very short, apical longitudinal septa --- 2
2. Basidia more than 4-spored, mycoparasite on *Phanerochaete sordida*, basidiocarp resupinate --- *Christiansenia pallida*
2'. Basidia 2- to 4-spored, basidiocarp conspicuous, white, gelatinous -------------------- 3
3. Probasidia lacking, basidia mostly 4-, rarely 2-spored, mycoparasite on corticioid fungi -- *Syzygospora alba*
3'. With probasidia, basidia mostly 2- or sometimes 3-spored, hyphae swollen ------------- -- ***Syzygospora nivalis***

In early developmental stages, terminal cells of hyphae already function as conidiogenous cells (Fig. 2,13-14). The conidial formation is very conspicuous in the development of fruiting bodies. Conidiophores produce two terminal cells frequently

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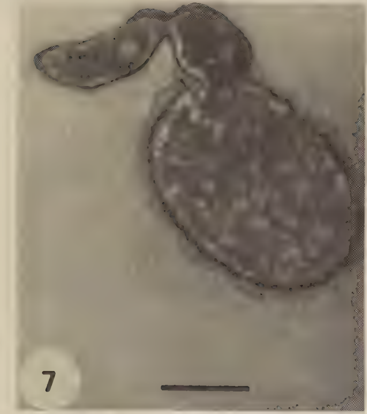
Fig. 7-12. *Syzygospora nivalis*. Haustoria and septal pores. 7. Haustorial branch penetrating host cell, bar=1 µm. 8. magnification of Fig. 7, bar=0.2 µm. 9. simple pore of conidiogenous cells, bar=0.2 µm. 10. dolipore of host cells with continuous parenthesomes, bar=0.5 µm. 11-12. dolipores of *S. nivalis*, bar=0.2 µm. Note lack of parenthesomes.

** Q value = length / breadth ratio (Bas, 1969).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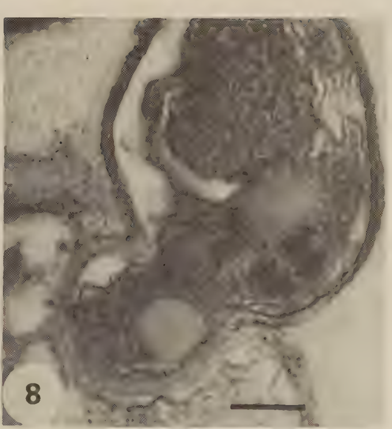
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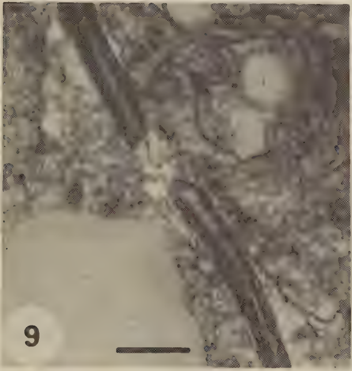
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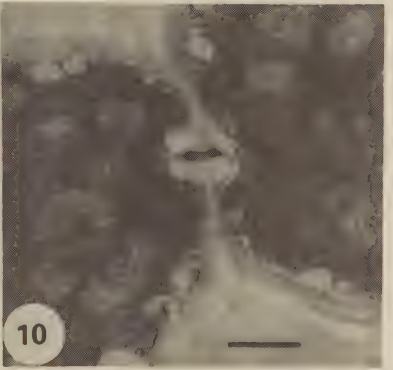
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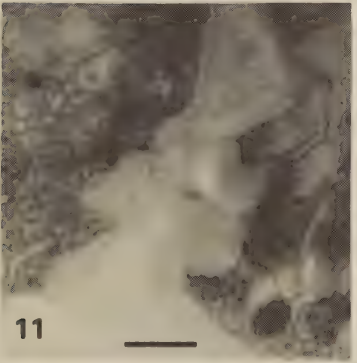
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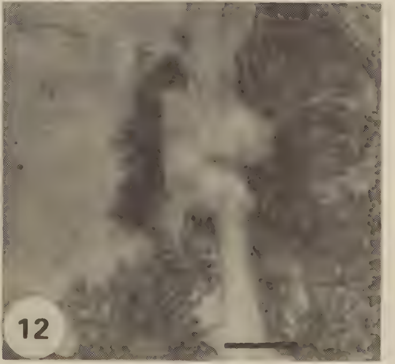
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fusing to form a one celled conidium, called a zygoconidium (Fig. 2-3, 13 & 14), that finally becomes detached. Sometimes conidia do not fuse (Fig. 2, 4, 13 & 14), and occasionally one conidiophore can produce more than two conidia around the transverse septum separating the cells (Fig. 13). The conidiogenous cells and conidia are very similar to those of *S. alba* and *C. pallida* (Martin, 1937; Hauerslev, 1969; Oberwinkler and Lowy, 1981; Oberwinkler et al., 1984; Ginns, 1986). Basidia and conidiophores grow from the same generative hyphae (Fig. 13). Probasidia are clavate, mostly proliferating, then producing metabasidia (Fig. 13). Such probasidia are absent in *S. alba* and *C. pallida*.

Oberwinkler et al. (1984) studied the ultrastructure of the septal pore apparatus in *C. pallida*. They found dolipores lacking parenthesomes. *Syzygospora nivalis* has similar dolipores without parenthesomes (Fig. 11-12) thus corresponding with *S. alba* (Oberwinkler and Lowy, 1981), *C. pallida* (Oberwinkler and Bandoni, 1982; Oberwinkler et al., 1984), *Filobasidium arachnophila* Malloch, Kane & Lahaie (Khan et al., 1981), *F. floriforme* Olive (Moore and Kreger-van Rij, 1972*), F. neoformans* Kwon-Chung (Kwon-Chung and Popkin, 1976), and *Trichosporonoides oedocephalis* Haskins & Spencer (Haskins, 1975). Moreover, unlike hyphae, the septal pore of conidiogenous cells is simple (Fig. 5, 9), as in *S. alba* (Oberwinkler and Lowy, 1981) and *C. pallida* (Oberwinkler et al., 1984). No basidiocarp of the host fungus was found with *S. nivalis*, but there are clamped hyphae (Fig. 13) and dolipores with continuous parenthesomes (Fig. 10), which indicate that the host is perhaps a species of the Auriculariales, Tulasnellales, Dacrymycetales, or Hymenochaetales (Oberwinkler, 1985).

The subglobose haustoria, developed from a clamp and separated from the originating cell by another clamp, are of the tremelloid type (Fig. 2, 13-14): a thread-like, apically unbranched or rarely branched hypha, growing irregularly, and becoming attached to host hyphae (Fig. 13). The ultrastructure of the host-parasite-interaction is the same as in *C. pallida* (Oberwinkler et al., 1984). The penetrating haustorium forms a sac with a cell wall layer surrounded by the host plasmamembrane (Fig. 7-8).

The three known taxa with zygoconidia are *S. alba*, *C. pallida* and *Z. gemellipara*. However, the auricularioid basidia and twinned zygoconidia of *Z. gemellipara* are quite different. The basidiocarp of *S. alba* is sessile, gyrose to subcerebriform, white and gelatinous (Martin, 1937; Oberwinkler and Lowy, 1981; Ginns, 1986). *Christiansenia pallida* grows mycoparasitically on the resupinate host *Phanerochaete sordida* (Hauerslev, 1969; Oberwinkler et al., 1984). Morphologically, *C. pallida* and *S. nivalis* differ mainly in the very different fruiting body morphology and basidial morphology. *Syzygospora nivalis* is similar to *S. alba* in its large basidiocarps, the size of basidia, and in basidiospores and zygoconidia. The two taxa can be distinguished as follows:

1. *Syzygospora nivalis* frequently has probasidia which are lacking in *S. alba*. In addition, *Syzygospora nivalis* has 2, rarely 3 sterigmata, while *S. alba* has mostly 4 or rarely 2 sterigmata.
2. the conidiogenous cells of *S. nivalis* are shorter [6-9(-11)x 3-4.5 µm] and smaller than those of *S. alba* (8-15 x 3.5-4 µm) (Ginns, 1986).
3. the hyphae of *S. nivalis* are frequently swollen.
4. in *S. nivalis* the basidiocarp of the host fungus is lacking, but as in some *Tremella* species, e.g. *T. encephala* and *T. aurantia*, the host hyphae are abundantly mixed in the fructification of the mycoparasite.

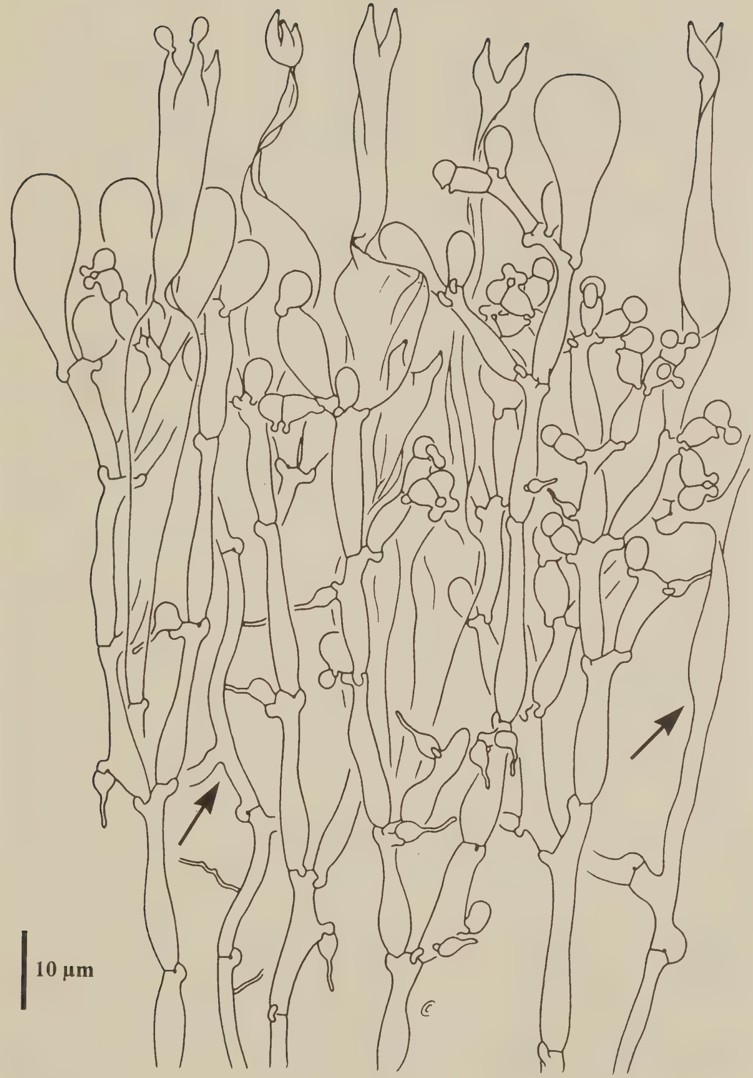

Fig. 13. Hymenial structure of *Syzygospora nivalis*. The mature basidia growing from probasidia, sometimes basidia and conidiogenous cells derived from the same generative hyphae. Note host hyphae mixing in the hymenium (arrows).

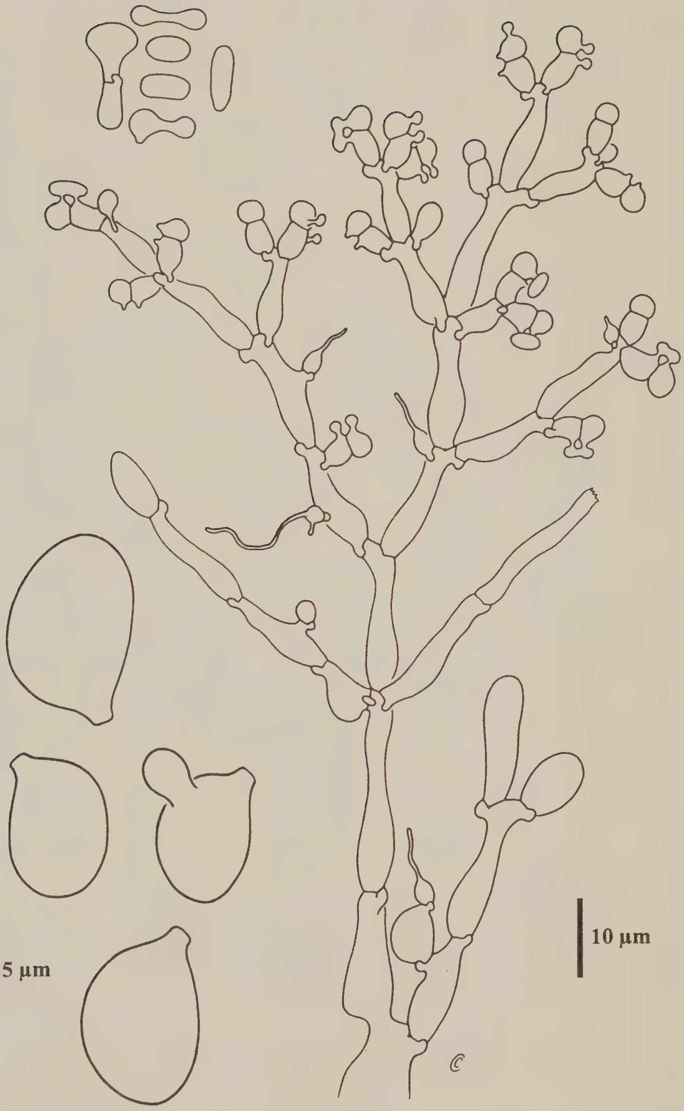

Fig. 14. Conidiogenous cells, conidia and basidiospores of *Syzygospora nivalis*.

Acknowledgments

Thanks to Dr. P. Roberts for kindly reviewing this paper and Dr. K. Hauerslev for critically reading the typescript. The Latin diagnosis corrected by Mr. M. Weiß is greatly appreciated. This study was supported by grants from the National Science Council of Taiwan (NSC86-2311-B002-014) and the sandwich cooperative program of NSC and DAAD (NSC DIII-NTU/2/96).

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Chinese Abstract

台灣新種 *Syzygospora nivalis* 與最近重新被研究的 *S. alba* Martin 很相似，二者皆為真菌寄生菌，子實體腦渦狀，白色膠質，以及具有接合分生孢子。唯不同於 *S. alba* 的是， *S. nivalis*. 具有原擔子體、分子孢子梗小、菌絲膨大以及寄主真菌不具子實體等特徵。

MYCOTAXON

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ANNOTATED CHECKLIST OF THE AMANITACEAE (AGARICALES, BASIDIOMYCOTINA) OF THE IBERIAN PENINSULA AND BALEARIC ISLANDS

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Summary

A checklist of 4700 records of 45 species of *Amanita* and 6 of *Limacella* is presented for the Iberian Peninsula (Spain and Portugal) and the Balearic Island (Spain). Synonymy, distribution, habitat and herbaria are noted for each taxon, as well as some observations.

Introduction and methodology

The elaboration of this catalogue forms part of the Iberian Micological Flora project and is straddled in the line of those already published for other groups (CALONGE,1990; TELLERÍA, 1990). It is based on the study of Iberian material of 4700 records in the AH, Barakaldo, BCC, GDAC, LEB-Fungi, L.A.Parra, LISU, LOU-Fungi, MA-Fungi, MUB and Valonsadero-Fungi herbaria as well as on bibliographical information. This heterogeneous information is filed on the data base, designed for this purpose, previously published by PANDO (1991). The catalogue has been arranged in alphabetical order and, for each taxon, notes on synonymy, distribution, habitat, herbaria consulted and observations are given.

For elaboration of the distribution data base I used the publications that mention species of this family for the Iberian Peninsula and Balearic Islands (PANDO & al., 1990; CARDOSO & MELO, 1992; PANDO, 1996). It has been simplified as much as possible, incorporating into each taxon only the abbreviation of each province. The complete information referred to in this paragraph is found in the data bases NOMENCOR.DBF and CENSOCOR.DBF of the Iberian Micological Flora, maintained by F. Pando (Real Jardín Botánico de Madrid, C.S.I.C.).

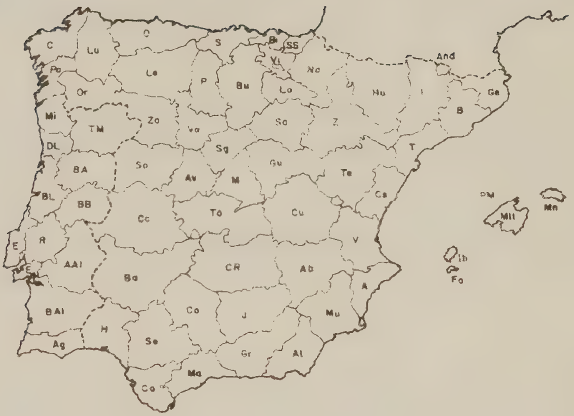
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Fig. 1. Provinces considered in the area

Catalogue

1. Amanita asteropus Sabo ex Romagn., *Bull. Soc. Mycol. France* 98: 165. 1982.

- *A. asteropus* Sabo [in Sabo & Massart], *Bull. Soc. Linn. Bordeaux*: 92. 1963, nom. nud.

Typus.- Herbarium Romagnesi, n° 57.310 (holotypus, ROMAGNESI, 1982: 165).

Distribution.- C.

Habitat.- In oak woods.

Herbarium.- LOU-Fungi.

2. Amanita battarrae (Boud.) Bon, *Doc. Mycol.* 16(61): 16. 1985.

≡ *Amanitopsis vaginata* var. *battarrae* Boud., *Bull. Soc. Mycol. France* 18: 272. 1902 [basion.].

Ind. Loc.- It is not indicated.

Distribution.- B, J, Lu, Or.

Habitat.- In mixed woods.

Herbariaum-BCC.

Observations.- The records of Lugo (Lu) and Orense (Or) (fig. 1), may be from mountainous localities, possibly, they correspond to *A. umbrinolutea*. There is no conserved material.

3. Amanita boudieri Barla, *Bull. Soc. Mycol. France* 3: 195. 1887.
= *A. baccata* (Fr.) Gillet, *Hymen.*: 50. 1874; = *Agaricus baccatus* Fr., *Epicr. Syst. Mycol.* 1: 12. 1836; = *Amanitopsis baccata* (Fr.) Sacc., *Syll. Fung.* 5: 25. 1887; = *A. solitaria* var. *baccata* (Fr.) Quél., *Fl. Mycol. France*: 306. 1888; = *A. barlae* Quél. [in Quélet & Bataille], *Fl. Amanit. Lépiot.*: 31. 1902.
- *A. lusitanica* Torrend, *Brotéria, sér. Bot.* 9: 92. 1910.
Ind. Loc.- "Région montagneuse, Montdaour".
Distribution.- Aal, Av, B, BB, C, Cc, DL, E, Ge, Gu, H, L, M, Mn, Po, R, Sg, Te, Va, Vi.
Habitat.- Under *Castanea sativa, Cistus ladanifer, Juniperus, Pinus pinaster* and *Quercus.*
Herbaria.- L.A.Parra, LISU, LOU-Fungi, MA-Fungi, MUB.

4. Amanita caesarea (Scop.: Fr.) Grev., *Scot. Crypt. Fl.:* 349. 1823.
≡ *Agaricus caesareus* Scop.: Fr., *Syst. Mycol.* 1: 15. 1821 [basion.].
= *A. caesarea* (Scop.) Pers., *Syn. Meth. Fung.: 252. 1801;* = *Agaricus aurantiacus* Bull., *Herb. France* 3: pl. 120. 1782-1783; = *A. aurantiaca* (Bull.) Lam., *Encycl. Method. Bot.* 1: 111, 1783.
- *A. caesarea* (Scop.: Fr.) Quél., *Champ. Jura*: 66. 1872.
Ind. Loc.- "In ericetis, pinetis, aliique ficcioribus et elatioribus locis sylvaticis sub aestatis et autumni".
Distribution.- Av, B, BB, Bi, BL, C, Ca, Cc, E, Ge, Gu, H, J, L, Le, Lo, Lu, M, Ma, Mi, Na, Or, Po, Sa, So, SS, T, Te, To, V, Vi .
Habitat.- Under *Arbutus unedo, Calluna vulgaris, Castanea, Fagus sylvatica, Genista scorpius, Lavandula spica, Pinus* and *Quercus.*
Herbaria.- BCC, GDAC, LISU, LOU-Fungi, MA-Fungi, Valonsadero-Fungi.

5. Amanita ceciliae (Berk. & Broome) Bas, *Persoonia* 12(2): 192. 1984.
≡ *Agaricus ceciliae* Berk. & Broome, *Ann. Magaz. Nat. Hist., sér.* 2, 13: 396. 1854 [basion.].
= *Agaricus solitarius* var. *strangulatus* Fr., *Epicr. Syst. Mycol.* 1: 6. 1836; = *Amanitopsis strangulata* (Fr.) Roze [in Karsten], *Hattsvampar*: 7. 1879; = *A. strangulata* (Fr.) Quél., *Champ. Jura*: 66. 1872; = *A. inaurata* Secr., *Mycographie*: 36. 1833 (nom. inval.); = *A. inaurata* Secr. ex Gillet, *Hymen*: 41. 1874.
Ind. Loc.- "In sylvis".
Distribution.- B, Bi, Bu, Cc, Co, E, Ge, H, Le, Lu, M, Na, S, Sa, So.
Habitat.- Under *Abies, Betula alba* , *Castanea, Cistus, Fagus sylvatica, Pinus pinaster*, *Quercus ilex* and *Quercus suber.*
Herbaria.- AH, Barakaldo, GDAC, LEB-Fungi, LOU-Fungi, MA-Fungi, Valonsadero-Fungi.

6. Amanita citrina (Schaeff.) Pers., *Tent. Disp. Meth. Fung.*: 66. 1797.

≡ *Agaricus citrinus* Schaeff., *Fung. Bav. Icon.* 1: pl.20, fig.1-5, 4: 12.1762 [basion.];

= *Agaricus mappa* Batsch, *Elench. Fung.*: 58. 1783; *Agaricus mappa* Batsch.ex Fr., *Epicr. Syst. Mycol.* 1: 6. 1836; *A. citrina* var. *mappa* (Batsch.) Pers., *Syn. Method. Fung.*: 251. 1801; *A. mappa* (Batsch : Fr.) Sacc., *Syll. Fung.* 5: 10. 1887.

- *A. citrina* (Schaeff.) Gray, *Nat. Arr. Br. Pl.*: 599. 1821; *A. citrina* (Schaeff.) Roques, *Phytogr. Med.* 1: 47. 1821

- *Agaricus mappus* f. *alba* Price, *Ill. Fung.*, pl. 66. 1864; *A. citrina* var. *alba* (Price) Quél. [in Quélet & Bataille], *Fl. Amanit. Lépiot.*: 36. 1902.

Ind. Loc.- "Cum agarico muscario, in siccioribus, arenosis & elatioribus sylvis, pascuis et pratis, augusto, seteptembre, octobri mersibus & quandoque in serum vaque autumnum"].

Distribution.- Ab, Al, Av, B, BAl, BB, Bi, BL, Bu, C, Ca, Cc, CR, Cu, DL, E, Ge, Gr, H, J, Le, Lo, Lu, M, Ma, Na, O, Or, Po, R, Sa, So, SS, T, Te, Vi.

Habitat.- Under *Betula*, *Castanea*, *Erica vagans*, *Eucalyptus globulus*, *Fagus sylvatica*, *Pinus* and *Quercus*.

Herbaria.- AH, Barakaldo, BCC, GDAC, LEB-Fungi, LISU, LOU-Fungi, MA-Fungi, MUB.

7. Amanita codinae (Maire) Singer, *Lilloa* 22: 388. 1951.

≡ *Lepidella codinae* Maire, *Treb. Mus. Ci. Nat. Barcelona, ser. Bot.* 15(2): 85. 1933 [basion.].

Ind. Loc.- "In silvaticis prope Franciac de la Selva Catalauniae".

Distribution.- Av, Ge, Gu, M, To, Va.

Habitat.- Under *Quercus ilex*.

Herbaria.- AH, GDAC, MA-Fungi.

8. Amanita crocea (Quél.) Singer, *Lilloa* 22: 386. 1951.

≡ *A. vaginata* var. *crocea* Quél., [in Bourdot]. *Rev. Sci. Bourbonnais Centr. France* 11(123): 52. 1898 [basion.].

Ind. Loc.- It is not indicated.

Distribution.- B, Bi, Bu, C, Ca, Ge, Gu, H, L, Le, Lu, M, Mn, Po, Vi.

Habitat.- Under *Abies alba, Betula alba* , *Fagus sylvatica* and *Quercus.*

Herbaria.- AH, Barakaldo, BCC, GDAC, LOU-Fungi, MA-Fungi.

9. Amanita curtipes J.-E.Gilbert, *Amanitaceae* 27, suppl. 1(2): 279. 1941 var. **curtipes.**

= *A. lepiotoides* f. *valens* J.-E.Gilbert, *Amanitaceae* 27, suppl. 1(2): 239. 1941; *A. valens* (J.-E.Gilbert) Bertault, *Bull. Soc. Mycol. France* 96: 281. 1980.

- *A. ovoidea* var. *gallaica* Losa, *Anales Jard. Bot. Madrid* 2: 124. 1942.

Ind. Loc.- "Gallia, Alpes maritimae, Berre-les-Alpes".

Distribution.- Av, C, Cc, Co, E, Ge, Gu, H, Ib, J, Le, Lo, M, Po, Sa, So, To, Va.

Habitat.- Under *Castanea, Cistus monspeliensis, Juniperus, Pinus* and *Quercus.*

Herbaria.- AH, GDAC, LEB-Fungi, LISU, LOU-Fungi, MA-Fungi, Valonsadero-Fungi.

Observations.- I consider that the names *A. curtipes* and *A. valens* correspond to the same taxon, since among the material studied were found specimens that corresponded macroscopically to the first and microscopically to the second and vice-versa (CASTRO, 1997).

10. Amanita curtipes var. **ponderosa** (Malençon & R.Heim) M.L. Castro, *Doc. Mycol.* 27(106): 45

≡ *Amanita ponderosa* Malençon & R.Heim [in Malençon], *Bull. Soc. Mycol. France* 58(1): 28. 1942.

Ind. Loc.- "In pinetis, Serra de Monchique (Lusitania) et in Querceto suberis, Forêt de Mamora (Mauretania), mense martii annis 1921 et 1937".

Distribution.- Av, Ba, Cc, E, Gu, H, Se.

Habitat.- Under *Cistus ladanifer*, *Halimium*, *Pinus pinea, Quercus ilex* and *Quercus suber.*

Herbaria.- AH, LOU-Fungi, MA-Fungi.

11. Amanita dunensis R.Heim ex Bon & Andary, *Doc. Mycol.* 13(50): 13. 1983.

- *A. phalloides* f. *dunensis* R.Heim, *Rev. Mycol.* 28(1): 3. 1963, nom. nud.

Typus.- Herbarium M.Bon, n° 4119 (holotypus BON & ANDARY, 1983: 13).

Distribution.- E.

Habitat.- Under *Pinus.*

Herbarium.-There is no known spanish collection.

12. Amanita eliae Quél., *Champ. Jura*: 230. 1872.

Ind. Loc.-"Forêt du diluvium et des collines des Vosges".

Distribution.- B, Bi, C, Ge, Po.

Habitat.- Under *Quercus robur* and in mixed woods.

Herbaria.- Barakaldo, LOU-Fungi.

13. Amanita flavescens (J.-E.Gilbert & S.Lundell) Contu, *Pagine Bot.* 12: 12. 1988.

≡ *A. vaginata* var. *flavescens* J.-E.Gilbert & S.Lundell [in E.-J.Gilbert], *Amanitaceae* 27, suppl. 1(2): 217. 1941 [basion.]; *Amanitopsis vaginata* var. *flavescens* (J.-E.Gilbert & S.Lundell) E.-J.Gilbert, *Amanitaceae* 27, suppl. 1: 75. 1940

Typus.- PC, Lundell n° 308, 4. Suède, Upsala, Slottsbacken.

Distribution.- B, Ge.

Habitat.- Under *Castanea*, *Pinus* and *Quercus ilex*.

Herbarium.- BCC.

14. Amanita franchetii (Boud.) Fayod, *Ann. Sci. Nat. (Bot.), ser.* 7: 316. 1889.

≡ *A. aspera* var. *franchetii* Boud., *Bull. Soc. Bot. France* 28: 91. 1881 [basion.]

Ind. Loc.- "Bois sablonneux et humides de Montmorency, 1871 et de la Sologne, à Cheverny, 1879".

Distribution.- B, Bi, C, E, Ge, H, Le, Lu, Mn, Na, R, S, T.

Habitat.- Under *Arbutus unedo*, *Fagus sylvatica*, *Pinus* and *Quercus.*

Herbaria.- AH, Barakaldo, BCC, LOU-Fungi.

Observations.- The names misapplied in the Iberian bibliography are: *A. aspera* Pers. (= *Lepiota aqutescuamosa*); *A. aspera* Vittad.; *A. aspera* (Fr.) Gillet; *A. aspera* (Vittad.) Quél.

15. Amanita fulva (Schaeff.) Fr., *Observ. Mycol.*: 2. 1815.

≡ *Agaricus fulvus* Schaeff., *Fung. Bav. Icon.* 1: pl. 95. 1762, 4: 41. 1774 [basion.]; ≡ *A. vaginata* var. *fulva* (Schaeff.) Gillet, *Hymen.*: 51. 1874; ≡ *Amanitopsis vaginata* var. *fulva* (Schaeff.) Sacc., *Syll. Fung.* 5: 21. 1887; ≡ *Amanitopsis fulva* (Schaeff.) Fayod, *Ann. Sci. Nat. (Bot.), sér.* 7, 9: 317. 1889.

Ind. Loc.: "In pascuis editioribus sylvaticis autumno provenit".

Distribution.- B, BB, Bi, BL, C, Cc, Cs, E, Ge, Gu, L, Le, Lu, M, Ma, Na, O, R, Sa, Vi.

Habitat.- Under *Abies alba, Betula alba* , *Castanea, Eucalyptus globulus, Fagus sylvatica, Pinus* and *Quercus.*

Herbaria.- AH, Barakaldo, BCC, LOU-Fungi, MA-Fungi.

16. Amanita gemmata (Fr.) Bertillon [in Dechambre], *Dict. Encycl. Sci. Médic.* I (3): 498. 1866.

≡ *Agaricus gemmatus* Fr., *Epicr. Syst. Mycol.* 1: 12. 1836 [basion.]; *Amanitopsis gemmata* (Fr.) Sacc., *Syll. Fung.* 5: 25. 1887, nom. dub.

= *Agaricus adnatus* W.G.Sm., [in Saunders & Smith]. *Mycol. Illustr.* 1: pl. 20. 1871; *Amanitopsis adnata* (W.G.Sm.) Sacc., *Syll. Fung.* 5: 24. 1887; = *A. junquillea* Quél., *Bull. Soc. Bot. France* 23: 324. 1876; = *Amanitopsis vaginata* var. *lutescens* Boud., *Icon. Mycol.* 1: 9 et pl. 8. 1905, 4: 4. 1911.

- *A. gemmata* (Fr.) Gillet, *Hymen.*: 52. 1874.

Ind. Loc.- "In silvis circa Parisios".

Distribution.- Ag, Av, B, BB, Bi, Bu, C, DL, E, Ge, Gu, H, Le, Lu, M, Na, Or, Po, R, Sg, So, SS, To.

Habitat.- Under *Arbutus unedo*, *Betula alba* , *Castanea*, *Eucalyptus globulus*, *Fagus sylvatica*, *Pinus* and *Quercus*.

Herbaria.- AH, Barakaldo, BCC, GDAC, LEB-Fungi, LISU, LOU-Fungi, MA-Fungi, Valonsadero-Fungi.

17. Amanita gilberti Beauseign., *Bull. Soc. Mycol. France* 41: 463, pl. 30. 1925.

Ind. Loc.- "18.V.1925, à 2 km. nord de Tartas (Landes) dans le sable des pins, puis les 1 et 8 juin à Magescq et Leon (Landes)".

Distribution.- C, E, Ge, H, Le, Po.

Habitat.- Under *Pinus* and *Quercus pyrenaica.*

Herbaria.- BCC, LOU-Fungi, MA-Fungi.

18. Amanita gracilior Bas & Honrubia, *Persoonia* 11: 511-514. 1982.

Typus.- Leiden, Herbarium Bas 6462 (holotypus BAS & HONRUBIA, 1982: 511).

Distribution.- Ab, Ca, Co, Ge, H, J, Po, T.

Habitat.- Under *Halimium, Pinus* and *Quercus.*

Herbaria.- BCC, GDAC, LOU-Fungi, MA-Fungi.

Observations.- This taxon has been frequently confused with *Amanita boudieri*, therefore I believe that it is a common species in all the Iberian Peninsula.

19. Amanita lactea Malençon, Romagn. & Reid, *Rev. Mycol., nouv. sér.* 32(5): 408. 1968.

Typus.- PC, Romagnesi n° 66.620 (holotypus MALENÇON, ROMAGNESI & REID, 1968: 408)

Distribution.- Ge, Gu.

Habitat.- Under *Quercus ilex.*

Herbarium.- MA-Fungi.

20. Amanita lividopallescens (Secr. ex Gillet) Seyot, *Amanites*: 67. 1930 var. **lividopallescens.**

≡ *A. vaginata* var. *lividopallescens* Secr. ex Gillet, *Hymen*., pl. 23. 1898 [basion.].
Ind. Loc.- "Sous les hêtres, vers la fin de septembre" (SECRETAN, 1833).
Distribution.- Ge, Le, Na.
Habitat.- Under *Fagus sylvatica, Populus, Pinus* and *Quercus.*
Herbarium.- There is no known spanish collection.

21. Amanita lividopallescens var. **malleata** Piane ex Romagn., *Bull. Soc. Mycol. France* 98(2): 169. 1982 .
- *A. malleata* Piane, *Bull. Soc. Naturalistes Oyonnax* 19-21: 51. 1972, nom. inval.
= *A. malleata* (Piane ex Bon) Contu, *Boll. Assoc. Micol. Ecol. Romana* 6/7: 43. 1986.
Typus: Herb. Romagnesi 57.46 (holotypus, ROMAGNESI, 1982: 169)
Distribution.- Bu, Ca, H, Lu.
Habitat.- Under *Betula alba* and *Quercus.*
Herbaria.- L.A.Parra, GDAC, LOU-Fungi.
Observations.- This taxon was typified by ROMAGNESI (1982) as *A. lividopallescens* var. *malleata*, while BON (1982 [1983]) named the type material (Bon n° 80092206) as *Amanitopsis malleata.* Finally, CONTU (1986) recombined it *A. malleata*.

22. Amanita mairei Foley, *Soc. Hist. Nat. Afrique N., mém. hors-sér*. 2: 117, pl. 4, fig. 1. 1949.
= *A. argentea* Huijsman, *Bull. Soc. Mycol. France* 75(1): 14. 1959; = *A. vaginata* var. *argentea* Contu, *Doc. Mycol*. 17(65): 62. 1986.
Ind. Loc.- "Environs d'Alger, Birmandreis (Le Paradou), sous *Pinus halepensis* L., en terrain argilo-siliceux, octobre-novembre; avril, en période pluvieuse".
Distribution.- Ab, B, Bu, C, Ca, Cs, Gr, J, Mn, Or, Po, Sa, Sg, So, T.
Habitat.- Under *Castanea, Pinus* and *Quercus.*
Herbaria.- AH, BCC, GDAC, L.A.Parra, LOU-Fungi, Valonsadero-Fungi.

23. Amanita muscaria (L.: Fr.) Hook., *Fl. Scot.* 2: 19. 1821 var. **muscaria**
≡ *Agaricus muscarius* L.: Fr., *Syst. Mycol*. 1: 16. 1821 [basion.]; ≡ *A. muscaria* (L.: Fr.) Secr., *Mycographie*: 10. 1833 (nom. inval.).
= *Agaricus aureola* Kalchbr., *Icon. Hymen*., pl. 1, fig. 1. 1873; = *A. muscaria* var. *aureola* (Kalchbr.) Quél., *Enchiridion:* 3. 1886; = *Agaricus pseudoaurantiacus* Bull., *Herb. France* 3: pl. 122. 1782-1783.
- *A. muscaria* (L.) Pers., *Synop. Method. Fung*.: 253. 1801.
Typus: TENN, coll. R.H. Petersen, 39847 (Neotypus, JENKINS & PETERSEN, 1976).

Distribution.- Aal, Ab, Av, B, BA, BB, Bi, BL, Bu, C, Ca, Cc, CR, Cs, Co, DL, E, Ge, Gu, H, Hu, J, L, Le, Lo, Lu, M, Ma, Na, O, Or, Po, R, S, Sg, So, SS, To, V, Vi, Z.

Habitat.- Under *Abies alba, Betula alba* , *Cistus, Eucalyptus, Fagus sylvatica, Juniperus, Picea excelsa, Pinus* and *Quercus suber.*

Herbaria.- AH, Barakaldo, BCC, GDAC, LEB-Fungi, LISU, LOU-Fungi, MA-Fungi, Valonsadero-Fungi.

Observations.- This is considered a very variable taxon, with various colorations, therefore there have been described numerous varieties by GILLET (1874). I consider that the following lack any taxonomic value: *A. muscaria* var. *puella* Gillet; *A. muscaria* var. *sanguinea* Gillet; *A. muscaria* var. *tomentosa* Gillet.

24. Amanita muscaria var. **formosa** (Pers.) Bertillon, [in Dechambre]. *Dict. Encycl. Sci. Médic.* I (3): 496. 1866.

≡ *A. muscaria* var. *formosa* Pers., *Observ. Mycol.* 2: 27. 1799 [basion.]; ≡ *A. muscaria* f. *formosa* (Pers.) Gonn. & Rabenh., *Mycol. Eur.*: 5. 1869.

Ind. Loc.- "Autumno in silvis".

Distribution.- B, Le, Lu, Po.

Habitat.- Under *Betula alba* , *Pinus* and *Quercus.*

Herbarium.- LOU-Fungi.

25. Amanita ovoidea (Bull.: Fr.) Link var. **ovoidea**, *Handb. Erkenn. Gewächse*: 273. 1833.

≡ *Agaricus ovoideus* Bull.: Fr., *Syst. Mycol.* 1: 15. 1821 [basion.].

= *Agaricus leiocephalus* DC., *Fl. Fr.* 6: 53. 1815; = *Amanitopsis leiocephala* (DC.) Sacc., *Syll. Fung.* 5: 24. 1887; = *A. leiocephala* (DC.) J.-E. Gilbert, *Amanitaceae* 27, suppl. 1(2): 278. 1941; = *Amanita ovoidea* (Bull.: Fr.) Quél., *Champ. Jura*: 230. 1872.

Ind. Loc.- "Octobre et novembre dans la forêt de Fontainebleau et dans les bois de Malesherbes".

Distribution.- A, Aal, Ab, Ag, Al, B, BAl, Bi, BL, Bu, C, Co, DL, E, Ge, Gr, Gu, Ib, J, L, Le, Lo, M, Ma, Mn, Mu, Na, PM, Po, R, T, Te, V, Vi.

Habitat.- Under *Castanea, Cistus, Pinus* and *Quercus.*

Herbaria.- Barakaldo, BCC, GDAC, LEB-Fungi, LISU, LOU-Fungi, MA-Fungi, MUB.

26. Amanita ovoidea var. **proxima** (Dumée) Singer, *Collect. Bot. (Barcelona)* 1: 228. 1947.

≡ *A. proxima* Dumée, *Bull. Soc. Mycol. France* 32: 83, pl. 2. 1916 [basion.]; ≡ *A. solitaria* var. *proxima* (Dumée) Bertaux, *Collect. Bot. (Barcelona)* 6(3): 467. 1964.

Ind. Loc.- "À Montereau (S.-et-M.), sur un coteau calcaire à peine recouvert de terre végétale".
Distribution.- B, BL, Bu, Ge, Lo, PM, T.
Habitat.- Under *Olea europea, Pinus halepensis* and evergreen-oak woods.
Herbarium.- L.A.Parra.

27. Amanita pachyvolvata (Bon) Krieglst., *Beih. Z. Mykol.* 5: 191. 1984.
≡ *Amanitopsis pachyvolvata* Bon, *Doc. Mycol.* 8(29): 36. 1978 [basion.].
Typus.- Herb. Bon 770906 (holotypus, BON, 1978: 36).
Distribution.- H.
Habitat.- Under *Castanea sativa.*
Herbarium.- GDAC.
Observations.- I have not studied the collection from the region of study.

28. Amanita pantherina (DC.: Fr.) Krombh., *Abbild. Schwämm.* 4: pl. 29, fig. 10. 1836 var. **pantherina.**
≡ *Agaricus pantherinus* DC.: Fr., Syst. Mycol. 1: 16. 1821 [basion.]; ≡ *A. pantherina* (DC.: Fr.) Secr., *Mycographie*: 20. 1833 (nom. inval.).
= *A. umbrina* Pers., *Syn. Method. Fung.*: 254. 1801.
- *A. pantherina* (DC.: Fr.) P.Kumm., *Führer Pilzk.*: 138. 1871.
Ind. Loc.- "Grammont, près Montpellier".
Distribution.- Av, B, BB, Bi, BL, Bu, C, Cc, Ca, Co, CR, Cs, DL, E, Ge, Gu, H, J, L, Le, Lo, Lu, M, Ma, Mn, Mu, Na, O, Po, R, Sa, Sg, So, SS, T, Vi.
Habitat.- Under *Castanea, Cistus, Corylus, Eucalyptus globulus, Fagus sylvatica, Juniperus, Pinus* and *Quercus.*
Herbaria.- AH, Barakaldo, BCC, GDAC, LEB-Fungi, LISU, LOU-Fungi, MA-Fungi, Valonsadero-Fungi.

29. Amanita pantherina var. **abietum** (J.-E.Gilbert) Vesely, *Annls Mycol.* 31(4): 272. 1933
≡ *A. abietum* J.-E.Gilbert [in Konrad], Bull. Soc. Mycol. France 45: 35. 1929 [basion.]; ≡*Amanita pantherina* subsp. *abietum* J.-E.Gilbert, *Amanitaceae* 27, suppl. 1(2): 269. 1941.
= *A. pantherina* var. *cariosa* (Fr.) J.-E.Gilbert, *Le genre Amanita:* 106. 1918.
Ind. Loc.-"Région de Lausanne (Secretan); Jura (Konrad)".
Distribution.- B, Ge, Le, T.
Habitat.- It is not indicated.
Herbarium.- There is no known spanish collection.

30. Amanita phalloides (Vaill.: Fr.) Link, Handb. Erkenn. Gewächse: 272. 1829.
≡ *Agaricus phalloides* Vaill..: Fr., *Syst. Mycol.* 1: 13. 1821 [basion.], ≡ *A. phalloides* (Vaill.: Fr.) Secr., Mycographie: 8. 1833 (nom. inval.).
Ind. Loc.- "Ubique in silvaticis".
Distribution.- Ab, Av, B, BB, Bi, BL, Bu, C, Ca, Cc, CR, DL, E, Ge, Gr, Gu, H, J, L, Le, Lo, Lu, M, Mn, Na, O, Or, Po, R, Sa, Se, So, SS, T, To, V.
Habitat.- Under *Betula, Castanea, Cistus, Corylus, Fagus sylvatica, Pinus* and *Quercus.*
Herbaria.- AH, BCC, GDAC, LISU, LOU-Fungi, MA-Fungi, MUB, Valonsadero-Fungi.

31. Amanita porphyria (Alb. & Schwein.: Fr.) Gillet, *Hymenom.:* 35. 1878.
≡ *A. porphyria* Alb. & Schwein.: Fr., *Syst. Mycol.* 1: 14. 1821 [basion.].
Ind. Loc.- "Sylvarum praesertim abietinarum loca uda sphagnosa subturfosa, quae ubique fare sparsus incolit. Septembri et octobri".
Distribution.- B, Bu, C, Ge, L, Le, Lu, Mll, Na, So.
Habitat.- Under *Betula alba* , *Fagus sylvatica, Pinus* and *Quercus.*
Herbaria.- LOU-Fungi, Valonsadero-Fungi.

32. Amanita porrinensis L.Freire & M.L.Castro, *Anales Jard. Bot. Madrid* 44(2): 533. 1987.
Typus.- Her. LOU-Fungi 3670 (holotypus FREIRE & CASTRO, 1987: 533)
Distribution.- Po.
Habitat.- Under *Quercus robur* and *Pinus pinaster.*
Herbaria.- LOU-Fungi, MA-Fungi.

33. Amanita rubescens (Pers.: Fr.) Gray, *Nat. Arr. Br. Pl.:* 600. 1821.
≡ *Agaricus rubescens* Pers.: Fr., *Syst. Mycol.* 1: 18. 1821 [basion.]; ≡ *A. rubescens* (Pers.: Fr.) Secr., Mycogrpaphie: 22. 1833 (nom. inval.).
= *Agaricus magnificus* Fr., *Epicr. Syst. Mycol.* 1: 10. 1836; = *A. magnifica* (Fr.) Sacc., *Syll. Fung.* 5: 19. 1887.
- *A. rubescens* var. *annulosulfurea* Gillet, *Hymen.*: 45. 1874; - *A. rubescens* f. *annulosulfurea* (Gillet) J.-E.Gilbert, *Amanitaceae* 27, suppl. 1(2): 356. 1941; - *A. rubescens* var. *circinata* Pers., *Syn. Method. Fung.:* 251. 1801; - *A. rubescens* f. *gracilis* Gillot & Lucand, *Hymen.*: 43. 1902.
Ind. Loc.- "Autumno in faginetis".
Distribution.-Av, B, Bal, BB, Bi, BL, Bu, C, Ca, Cc, DL, E, Ge, Gu, H, J, L, Le, Lo, Lu, M, Mi, Mn, Na, O, Or, Po, R, Sa, Sg, So, SS, T, To, Za.
Habitat.- Under *Abies alba, Betula alba* , *Castanea, Fagus sylvatica, Picea, Pinus* and *Quercus.*

Herbaria.- AH, Barakaldo, BCC, GDAC, LEB-Fungi, LISU, LOU-Fungi, MA-Fungi, Valonsadero-Fungi.

Observations.- In a agreemente with GILBERT (1941: 356), I consider that the varieties and mentioned forms lack any taxonomic value.

34. Amanita solitaria (Bull.: Fr.) Mérat, *Nouv. Fl. Environs Paris* [4ª ed.] 1: 121. 1836

≡ *Agaricus solitarius* Bull.: Fr., *Syst. Mycol.* 1: 17. 1821 [basion.]; ≡ *A. solitaria* (Bull.: Fr.) Secr.; Mycographie: 14. 1833 (nom. inval.).

= *Agaricus echinocephalus* Vittad., *Descr. Fung. Mang.:* 346. 1835; = *A. echinocephala* (Vittad.) Quél., *Champ. Jura*: 321. 1872 .

Distribution.-B, BB, Bu, Cu, E, Ge, Gr, H, J, L, Le, Lo, Mll, Na, Po, Te, Va, Vi.

Habitat.- Under *Cistus, Pinus sylvestris* and *Quercus*..

Herbaria.- Barakaldo, BCC, LISU, MA-Fungi.

35. Amanita spissa (Fr.) P.Kumm., *Führer Pilzk.*: 138. 1871 var. **spissa.**

≡ *Agaricus spissus* Fr., *Epicr. Syst. Mycol.* 1: 9. 1836 [basion.].

Ind. Loc.- "In silvis campestris, circa Upsaliam tantum legi".

Distribution.-B, BB, Bi, BL, C, E, Ge, Le, Lo, Lu, M, Na, Po, Sg, So, Te, Vi.

Habitat.- Under *Betula alba* , *Fagus sylvatica, Pinus* and *Quercus.*

Herbaria.- BCC, GDAC, LISU, LOU-Fungi, MA-Fungi, Valonsadero-Fungi.

36. Amanita spissa var. **excelsa** (Fr.: Fr.) Dörfelt & I.L.Roth, *SchrReihe Vogtlandmus. Plauen* 49: 24. 1982.

≡ *Agaricus excelsus* Fr., *Syst. Mycol.* 1: 17. 1821 [basion.]; ≡ *A. excelsa* (Fr.) Quél., *Champ. Jura:* 68. 1872.

= *A. ampla* Pers., *Syn. Method. Fung.*: 255. 1801.

Ind. Loc.- "In dumetis alibique, Agost. Sept."

Distribution.- B, Bi, C, Cs, Ge, Le, Lu, M, Na, Po.

Habitat.- Under *Betula alba* , *Castanea, Fagus sylvatica, Pinus pinaster* and *Quercus.*

Herbaria.- AH, GDAC, LOU-Fungi, MA-Fungi.

37. Amanita spissa var. **valida** (Fr.) Dörfelt & I.L.Roth, *SchrReihe Vogtlandmus. Plauen* 49: 24. 1982.

≡ *Agaricus validus* Fr., *Epicr. Syst. Mycol.* 1: 7. 1836 [basion.]; ≡ *A. valida* (Fr.) Quél., *Champ. Jura*: 69. 1872; ≡ *A. spissa* var. *valida* (Fr.) J.-E.Gilbert, *Le genre Amanita*: 112. 1918.

- *A. pseudorubens* Losa, *Anales Jard. Bot. Madrid* 3: 139. 1943.

Ind. Loc.- "In pinetis campestris, Upsaliae".
Distribution.- B, C, H, Po.
Habitat.- Under *Fagus sylvatica* and *Pinus pinaster*.
Herbaria.- LOU-Fungi, MA-Fungi.

38. Amanita strobiliformis (Paulet ex Vittad.) Bertillon [in Dechambre], *Dict. Encycl. Sci. Médic.* I 3: 499. 1866.
≡ *Agaricus strobiliformis* Paulet ex Vittad., *Descr. Fung. Mang.*: 59. 1832 [basion.]
- *A. strobiliformis* (Vittad.) Quél., *Champ. Jura*: 68. 1872
Typus.- Paulet, *Icon. Champ.*, pl. 162, fig. 1. 1812-1835, sub. *Hypophyllum strobiliforme* (lectotypus BAS, 1969: 519).
Distribution.- Bi, E, Ge, H, Ib, Le, Na, T.
Habitat.- Under *Pinus* and *Quercus*.
Herbaria.- BCC, GDAC.

39. Amanita submembranacea (Bon) Gröger, *Boletus* 3(2): 27. 1979.
≡ *Amanitopsis submembranacea* Bon, *Bull. Soc. Linn. Lyon* 44(6): 176. 1975 [basion.].
Typus.- Herb. Bon 740 917 (holotypus BON, 1975: 176).
Distribution.- Ge, Lu, So.
Habitat.- Under *Betula alba* , *Pinus* and *Quercus pyrenaica*.
Herbaria.- LOU-Fungi, Valonsadero-Fungi.

40. Amanita supravolvata Lanne, *Doc. Mycol.* 9(34): 24. 1979.
Typus.- Herbarium C. Lanne, n° 1 (holotypus LANNE, 1979: 24). Then there is material missing here, isotype in herbarium Tulloss (TULLOSS, 1994: 376).
Distribution.- Po.
Habitat.- Under *Pinus pinaster*.
Herbarium.- LOU-Fungi.

41. Amanita umbrinolutea (Secr. ex Gillet) Bataille, *Bull. Soc. Mycol. France* 26: 139. 1910.
≡ *A. inaurata* var. *umbrinolutea* Secr. ex Gillet, *Hymen.*: 42. 1874 [basion.]; ≡ *A. vaginata* var. *umbrinolutea* (Secr.ex Gillet) J.-E.Gilbert, *Le genre Amanita*: 146. 1918; ≡ *Amanitopsis umbrinolutea* (Secr. ex Gillet) J.-E.Gilbert, *Bull. Soc. Mycol. France* 44(2): 164. 1928; ≡ *A. umbrinolutea* Secr., Mycographie: 34. 1833 (nom. inval.).
Ind. Loc.- "Sous les sapins, à la fin de septembre" (SECRETAN, 1833).
Distribution.- B, Bi, Bu, Ge, J, L, Le, M, Na, Sa, Sg.

Habitat.- Under *Abies alba, Fagus sylvatica, Pinus* and *Quercus pyrenaica.*
Herbaria.- AH, Barakaldo, BCC.

42. Amanita vaginata (Bull.: Fr.) Vittad., *Descr. Fung. Mang.*: 30. 1835 var. **vaginata**

≡ *Agaricus vaginatus* Bull.: Fr., *Syst. Mycol.* 1: 14. 1821[basion.]; ≡ *Amanitopsis vaginata* (Bull.: Fr.) Roze, *Bull. Soc. Bot. Fr.* 23: 111. 1876.

= *Agaricus plumbeus* Schaeff., *Fung. Bav. Icon.* 1: pl. 85-86. 1762, 4: 37. 1774, = *A. vaginata* var. *plumbea* (Schaeff.) Quél. [in Quélet & Bataille], *Fl. Amanites & Lepiotes: 42. 1902*, = *Amanitopsis plumbea* (Schaeff.) J.Schröt. [in Cohn], *Krypt.-Fl. Schles.*: 676. 1889, = *Amanitopsis vaginata* var. *plumbea* (Schaeff.) Singer, *Collect. Bot. (Barcelona)* 1(3): 228. 1947; = *Agaricus vaginatus* var. *cinereus* De Seynes, *Fl. Mycol. Montpellier*: 105. 1863, = *A. vaginata* var. *cinerea* (De Seynes) Gillet, *Hymen.*: 51. 1874,= *Agaricus vaginatus* var. *griseus* DC., *Fl. Fr.*: 53. 1815, = *A. vaginata* var. *nivalis* s. Maire, *Treb. Mus. Cienc. Nat.. Barcelona, sér. Bot. 15*(2): 88. 1933 (FRAITURE, 1993: 64).; = *A. vaginata* f. *grisea* (DC.) Vesely, *Annls Mycol.* 31(4): 279. 1933.

- *Amanita vaginata* var. *alba* (de Seynes) Gillet, *Hymen.*: 51. 1874; - *Agaricus vaginatus* var. *albus* de Seynes, *Fl. Mycol. Montpellier*: 105. 1863; - *A. vaginata* (Bull.:Fr.) Quél., *Champ. Jura*: 302. 1872.

Ind. Loc.- "En juin, juillet et août dans les bois".
Distribution.- Aal, Ag, Al, Av, B, BB, Bi, BL, Bu, C, Ca, Cc, Co, Cs, DL, E, Ge, Gu, H, J, L, Le, Lo, Lu, M, Mll, Na, PM, Po, R, Sa, Sg, So, SS, T, V.
Habitat.- Under *Betula alba* , *Castanea, Cistus, Corylus, Fagus sylvatica, Pinus, Populus* and *Quercus.*
Herbaria.- AH, GDAC, LEB-Fungi, LISU, LOU-Fungi, MA-Fungi, Valonsadero-Fungi.
Observations.- This a taxon is very variable, in the color of the pileus and without any taxonomic value. The distribution of this species cannot be known with accuracy, due to the difficulty in separating the different taxa of section *Vaginatae.*

43. Amanita verna (Bull.: Fr.) Vittad., *Tent. Mycol.*: 20. 1826.

≡ *Agaricus vernus* Bull.: Fr., *Syst. Mycol.* 1: 13. 1821 [basion.]; ≡ *A. phalloides* var. *verna* (Bull.: Fr.) Maire, *Treb. Mus. Cienc. Nat.. Barcelona, sér. Bot. 15*(2): 86. 1933; *A. verna* (Bull.) Lam. [in Lamarck & Poiret], Encycl. 1: 113. 1783.

Ind. Loc.- "Bois au printemps".
Distribution.- Av, B, BB, Bi, Bu, C, DL, E, Ge, Gu, H, Le, Lo, M, Mi, Na, Po, R, So, T, Te, V, Va.
Habitat.- Under *Castanea, Pinus* and *Quercus.*

Herbaria.- BCC, L.A.Parra, LEB-Fungi, LISU, LOU-Fungi, MA-Fungi, Valonsadero-Fungi.

44. Amanita virosa Lam. [in Lamarck & Poiret], *Encycl.* 1: 113. 1783
= *Agaricus virosus* Fr., *Epicr. Syst. Mycol.* 1: 3. 1836 [basion.]; *A. virosa* (Fr.) Bertillon [in Dechambre], *Dict. Encycl. Sci. Médic.* I (3): 510. 1866; *A. virosa* Secr. *Mycographie*: 6. 1833 (nom. inval.).
- *A. virosa* (Fr.) Quél., *Champ. Jura*: 66. 1872.
Ind. Loc.- "In silvis".
Distribution.- Bi, C, DL, E, M, PM, O, S.
Habitat.- Under *Fagus sylvatica, Pinus* and *Quercus.*
Herbarium.- Barakaldo.

45. Amanita vittadinii (Moretti) Vittad., *Tent. Mycol.*: 31, pl. 1. 1826.
≡ *Agaricus vittadinii* Moretti, *G. Fis. Chim. Stor. Nat. Med. Decade* II 9: 66. 1826 [basion.]; ≡ *Lepidella vittadinii* (Moretti) J.-E.Gilbert, *Bull. Soc. Mycol. France* 41: 304. 1925.
Typus.- Moretti, *G. Fis. Chim. Stor. Nat. Med. Decade* II 9: pl. 1. 1826 (lectotypus BAS, 1969: 349)
Distribution.- Av, B, Co, E, Ge, Gu, H, Ib, Le, M, P, Sa, So, Z.
Habitat.- Under *Pinus pinea*, *Quercus ilex* and *Ulmus.*
Herbaria.- AH, LEB-Fungi, MA-Fungi.

46. Limacella arida (Fr.) J.-E. Gilbert, *Le genre Amanita*: 165. 1918.
≡ *Agaricus aridus* Fr., *Epicr. Syst. Mycol.* 1: 10. 1836 [basion.].
Ind. Loc.- "In betuletis aridis, aestate calidissima in Smolandie occidentalis".
Distribution.- L.
Habitat.- It is not indicated (SINGER, 1947: 227).
Herbaria.- There is no known collection from the region of study.

47. Limacella furnacea (Letell.) J. -E. Gilbert, *Spore Champ. Sup.*: 96. 1927
≡ *Agaricus furnaceus* Letell., *Ann. Sci. Nat.* 3: 91. 1835 [basion.].
= *Limacella megalopoda* (Bres.) Maire, *Bull. Soc. Mycol. France* 40: 293. 1924
Ind. Loc.- "Saint-Leu".
Distribution.- Ab, B, Bi, Fo, Ib, L, Mll, Mn, PM, Mu, V.
Habitat.- Under *Juniperus phoenicea, Pinus* and *Quercus ilex.*
Herbarium.- MA-Fungi.
Observations.- MALENÇON & BERTAULT (1971) referred this taxon to *Limacella subfurnacea.* However, CONTU (1990) indicates in the description of this species as follows: "a dettagliata descrizione di questa

entità [*L. subfurnacea*] può trovarsi in MALENÇON & BERTAULT (1970: 89-91), sub *Limacella furnacea*".

48. Limacella glioderma (Fr.) Maire, *Bull. Soc. Mycol. France* 40(4): 294. 1924.
≡ *Agaricus gliodermus* Fr., *Monogr. Hymen. Suec.*, 15. 1857 [basion.].
Ind. Loc.- "In pineto denso, udo ad Sunnerstad prope Upsaliam".
Distribution.- B, T.
Habitat.- Under *Pinus* and *Quercus ilex*
Herbarium.- There is no known collection from the region of study.

49. Limacella guttata (Pers.: Fr.) Konrad & Maubl., *Icon. Fung*. 1: Pl. 9. 1924.
≡ *Agaricus guttatus* Pers.: Fr., *Syst. Mycol*. 1: 27. 1821 [basion].
= *Agaricus lenticularis* Lasch, *Linn*. 3: 157. 1828; = *Agaricus lenticularis* Lasch ex Fr., *Epicr. Syst. Mycol*. 1: 10. 1836; = *Limacella lenticularis* (Lasch ex Fr.) Maire, *Bull. Soc. Mycol. France*, 30: 203. 1914
Ind. Loc.- "In pinetis montosis".
Distribution.- B, Bi, E, Gr, T.
Habitat.- On coniferous and decidous woods.
Herbarium.- There is no known collection from the region of study.

51. Limacella illinita (L.: Fr.) Murrill, *North Am. Fl.* 10: 40. 1914.
≡ *Agaricus illinitus* L.: Fr., *Syst. Mycol*. 1: 23. 1821 [basion.].
Ind. Loc.- "In pratis colliculosis ericetis Europae borealis. Jul. - Oct".
Distribution.- Al, B, Bu, Ge, Gr, Hu, J, L, Le, Na, Sa, Sg, V, Va.
Habitat.- Under *Pinus, Quercus* and *Tamarix.*
Herbarium.- MA-Fungi.

52. Limacella subfurnacea Contu, *Bol. Soc. Brot., ser*. 2 (62): 380. 1990.
Typus.- Herb. Contu, 89/454 (CONTU, 1990: 380).
Distribution.- B, L, T.
Habitat.- Under *Pinus halepensis.*
Herbarium.- There is no known collection from the region of study.

INCERTA SERIE:
1. Agaricus vernus Gmel. (COLMEIRO, 1889: 574)
2. A. bulbosa (Bull.) Pers. (ROLLAND, 1904: 195)
3. A. cinerea (SOLÁ, 1925: 23)
4. A. murina Roques (LÁZARO E IBIZA, 1904: 336)
5. A. pantherina var. *abietina* (BERTAUX, 1964: 461)
6. A. vaginata var. *major* Gillet (HERNÁNDEZ PACHECO, 1900: 115)

7. *A. venenosa* Pers. (POMATA, 1882: 306)
8. *A. virescens* Pers. (LACOIZQUETA, 1885: 209; LÁZARO E IBIZA, 1904: 336)

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MYCOTAXON

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DACTYLOSPORA CANARIENSIS SP. NOV.

AND NOTES ON *D. HALIOTREPHA*

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ABSTRACT

The marine fungus, *Dactylospora canariensis* is described from driftwood collected on the shores of Tenerife (Canary Islands). It is compared with *Banhegyia setispora*, a strikingly similar terrestrial species in the Patellariaceae, with which it had originally been confused. *D. canariensis* and *D. haliotrepha* are the only marine members in the Dactylosporaceae. In pure culture mycelia of *D. haliotrepha* produce antheridia with spermatia.

INTRODUCTION

Zeller and Tóth (1960) described the apothecial ascomycete *Banhegyia setispora* Zeller & Tóth on dead branches of *Juniperus communis* L. from the Bükk mountains in Hungary. This fungus was recently reexamined by Kutorga and Hawksworth (1997) and recognized as a typical member of Patellariaceae. In a paper on marine fungi from the Canary Islands, a species that appeared to be identical with *B. setispora* was described and illustrated (Kohlmeyer 1967, as *B. uralensis* comb. nov.). However, this misidentification was later recognized, and Kutorga and Hawksworth (1997) confirmed that the fungus from Tenerife was indeed a different species. We reexamined the original collection from Herb. B and describe the species in the following.

TAXONOMY

Dactylospora canariensis Kohlm. & Volkm.-Kohlm., sp. nov.
Etymology: In reference to the type locality, Canary Islands.

Ascomata *240-460 μm diam., 140-180 μm alta (ad centrum), primo semiglobosa vel truncato-conica, deinde discoidea, apothecialia, erumpentia, denique superficialia, sessilia sed ad bases in pedes cuneatis contracta et in substrato immersa, carnoso-coriacea; hymenium atrobrunneum ubi humidum, atrum ubi exsiccatum, solitaria vel gregaria.* Excipulum *pseudoparenchymaticum, cellulis isodiametricis vel subglobosis, texturam angularem formans, crassum in latere, tenue in marginem supernum, dilute brunneum.* Hypothecium *pseudoparenchymaticum, parvum evolutum, hyalinum ad dilute brunneum, ad basem confluens in pedem atrobrunneum.* Hamathecium *paraphysibus septatis, haud furcatis, 70-85 x 1.5 μm, cylindricis, apicaliter inflatis ad 4-7 μm diam., hyalinis, apice brunneo; hymenium primo pseudoepithecio brunneo tectum, deinde friato.* Asci *55-85 x 15-20 μm, octospori, clavati, breve pedunculati, unitunicati, non fissitunicati, non amyloidei, sed apex tectus cucullo gelatinoso iodo colorem caeruleum ducente.* Ascosporae *17-23 x 7-9 μm ($\bar{x}$ = 19.6 x 7.6 μm; n = 30), oblique biseriatae, ellipsoideae, uniseptatae, ad septum constrictae, hyalinae ad dilute brunneae, appendiculatae; quatuor ad sex setae, terminales, radiantes, deciduae, usque ad 14 μm longae utrinque ornatae.*

Substratum*: Lignum fluitandum in littore.*

Distributio: *Littus Oceani Atlantici* (Hispania, Insulae Canarienses).

HOLOTYPUS: J.K. 2258 (**B**); ISOTYPUS: J.K. 2258 (**IMS**).

Ascomata rehydrated 240-460 μm diam., 140-180 μm thick, initially semiglobose or truncate-conical, then discoid, apothecial, erumpent, finally superficial, sessile, but wedged with a pseudoparenchymatous root-like base into the wood, fleshy-leathery, hymenial surface dark brown when wet, black when dry, solitary or gregarious on the wood surface or on the walls of old shipworm tunnels. *Excipulum* pseudoparenchymatous, composed of isodiametrical or subglobose cells, forming a *textura angularis* in longitudinal section, laterally thick, thinner towards the upper margin, light brown. *Hypothecium* pseudoparenchymatous, little developed, hyaline to light brown, merging with the dark brown foot at the base. *Hamathecium* composed of septate, unbranched pseudoparaphyses, 70-85 x 1.5 μm, cylindrical, hyaline, apex ellipsoidal to subglobose, light brown, inflated to 4-7 μm diam. The hymenium is initially covered by a brown pseudoepithecium that crumbles away in mature apothecia. *Asci* 55-85 x 15-20 μm, eight-spored, clavate, short pedunculate, unitunicate, not fissitunicate, I^-, but apically covered by an IKI positive gelatinous cap. *Ascospores* 17-23 x 7-9 μm ($\bar{x}$ = 19.6 x 7.6 μm; n = 30), obliquely biseriate, ellipsoidal, one-septate, constricted at the septum, hyaline to light brown, appendaged; at each end four to six terminal, radiating, bristlelike, deciduous setae, up to 14 μm long.

Substratum: Intertidal wood.

Distribution: Atlantic Ocean (known only from the Canary Islands).

Material Examined: Decorticated wood with empty shipworm tunnels, Puerto de la Cruz, Tenerife, Canary Islands, 28°25N, 16°32'W, 27 Nov. 1964, J.K. 2258 (HOLOTYPE, **B**; ISOTYPE, **IMS**); associated fungi: *Kirschsteiniothelia maritima* (Linder) Hawksw., *Zalerion maritimum* (Linder) Anast. Illustrations: Kohlmeyer 1967 (as *Banhegyia uralensis*) and Kohlmeyer and Kohlmeyer 1968 (Tabula 71, as *Banhegyia setispora*).

Dactylospora canariensis appears to be a rare species because it has not been reported again in over 30 years after it was first collected on Tenerife (Kohlmeyer 1967), and may possibly be endemic. It can be classified as an obligate marine fungus, considering its association with two other obligately marine species and its development on the walls of empty teredinid tunnels.

The fungus from the Canary Islands has a striking similarity with *Banhegyia setispora*, the main difference being a unitunicate ascus with a gelatinous I^+ cap that is absent in the bitunicate *B. setispora*. The two species can serve as excellent examples of parallel evolution in the Dactylosporaceae (Bellemère & Hafellner 1982) and Patellariaceae (Kutorga & Hawksworth 1997).

Attempts to place the new species in a family by using the key of Hawksworth et al. (1995) leads to Dactylosporaceae, and Hafellner's (1979) key leads to *Dactylospora*. There is no species in this genus with appendaged ascospores. However, there are some species with ornamental spore walls and the origin of bristles from ornaments, such as longitudinal ribs, appears plausible. Ornamented ascospores occur, for instance, in *D. bloxamii* (Berk.) Hafellner, *D. haliotrepha* (Kohlm. & E. Kohlm.) Hafellner and *D. stygia* (Berk. & M. A. Curtis) Hafellner (Hafellner 1979, Bellemère and Hafellner 1982, Nakagiri 1993). This perisporial ornamentation of the ascospore wall is considered to be a highly evolved feature in *Dactylospora* (Bellemère & Hafellner 1982).

Dactylospora haliotrepha and *D. canariensis* are the only marine species in the genus. Because of its saltwater adaptation, *D. haliotrepha* had been assigned earlier to a genus of its own, *Kymadiscus* Kohlm. & E. Kohlm. (Kohlmeyer & Kohlmeyer 1971). Molecular studies should establish the proper placement of the two marine dactylosporas.

Hyphae of *D. haliotrepha* produce antheridia in culture (Kohlmeyer & Volkmann-Kohlmeyer, unpublished) that to our knowledge have not been reported for other *Dactylospora* species. These antheridia develop laterally from simple hyphae and consist of an urn-shaped basal cell bearing a larger ellipsoidal, thin-walled cell containing about 8 ellipsoidal spermatia.

We have not observed spermatization, but 14 months old cultures produced mature ascomata, and a sexual process can be assumed. According to Parbery (1996) such spermatial states may be termed 'andromorphs,' because they do not function as conidia.

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WRIGHTOPORIA PORILACERATA, A NEW SPECIES OF PORE FUNGI FROM SOUTHERN BRAZIL

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ABSTRACT

Wrightoporia porilacerata is described as new and is characterized by a pileate, fleshy and soft basidiocarp, monomitic hyphal construction and subcylindrical, finely asperulate amyloid spores.

INTRODUCTION

Since Pouzar described *Wrightoporia* in 1966 (Pouzar 1966), the genus has twice been comprehensively treated with a survey of existing species Ryvarden (1982) and David & Rajchenberg (1987). Corner (1989) discussed the genus and reduced it to a subgenus in *Stecchericium* Reid and gave a key to the Malesian species previously placed in *Wrightoporia*.

Scattered species has also been described by Ryvarden, 1989 (*W. perplexa* from Nepal); Bi & Zheng, 1987 (*W. subadusta* from China); Rajchenberg & David, 1990 (*W. novae-zealandiae* from New Zealand) and Dai, 1995 (*W. rubella* from China).

The original description asked for a poroid hymenophore, a dimitic hyphal system with dextrinoid skeletal hyphae and amyloid spores, in most species finely ornamented. Later there have been described species being both monomitic and dimitic, with and without non-dextrinoid skeletal hyphae (see David & Rajchenberg op. cit.). Corner (op. cit) introduced a much wider concept since he joined the poroid species of *Wrightoporia* with the hydnoid species of *Stecchericium*. The species of the latter have amyloid ornamented spores, but large encrusted skeletocystidia and skeletal hyphae without dextrinoid reaction. We feel that Corner´s wide concept is unacceptable being based on the small amyloid spores alone, a character of which we do not have any notion as to its evolutionary significance.

In the classification of the polypores we still are using a rather pragmatic system of classification based on rather easily identified micro- and macroscopical characters which in the end may be proven to be convergent characters (see Ryvarden 1995). Some time in the future when more comprehensive DNA studies have been preformed, we may see that true outline of the evolution among these fungi. Thus, for the time being we have to stick with micro- and macroscopic characters in our classification and we feel that taxonomy in this case is best served by keeping *Wrightoporia* confined to poroid species with small ornamented amyloid spores and without a spiny hymenophore and encrusted skeletocystidia.

In 1996 one of us (C.L.Leite) received a large fleshy polypore for identification and a microscopical examination soon revealed that it probably belonged in *Wrightoporia*. A sample was sent to Oslo for verification and a search in the literature (see above) did not give a clue to its identity. We thus came to the conclusion that it represented a new species which is described below.

MATERIAL AND METHODS

Basidiocarps were studied according to the methodology of Loguercio-Leite & Wright (1991). Colours are according to Munsell (1975) and herbaria abbreviations listed by Holmgrem *et. al.* (1990).

DESCRIPTION

Wrightoporia porilacerata Loguercio-Leite, Gerber & Ryvarden *nov. sp.*

Fructificatio sessilia, pileus et pori facies ochraceus, systema hypharum monomiticum, hyphae generatoriae fibulatae, tenui - ad crasse tunicatae, basidiosporae hyalinae, asperae, amyloideae, 3-3.5 x 2 µm.

Holotype in Brazil, Santa Catarina, Ilha de Santa Catarina, Saco Grande (UCAD), Coll.: Queiroz n° 946, 31 May 1996, FLOR 11455; **Isotype** in O.

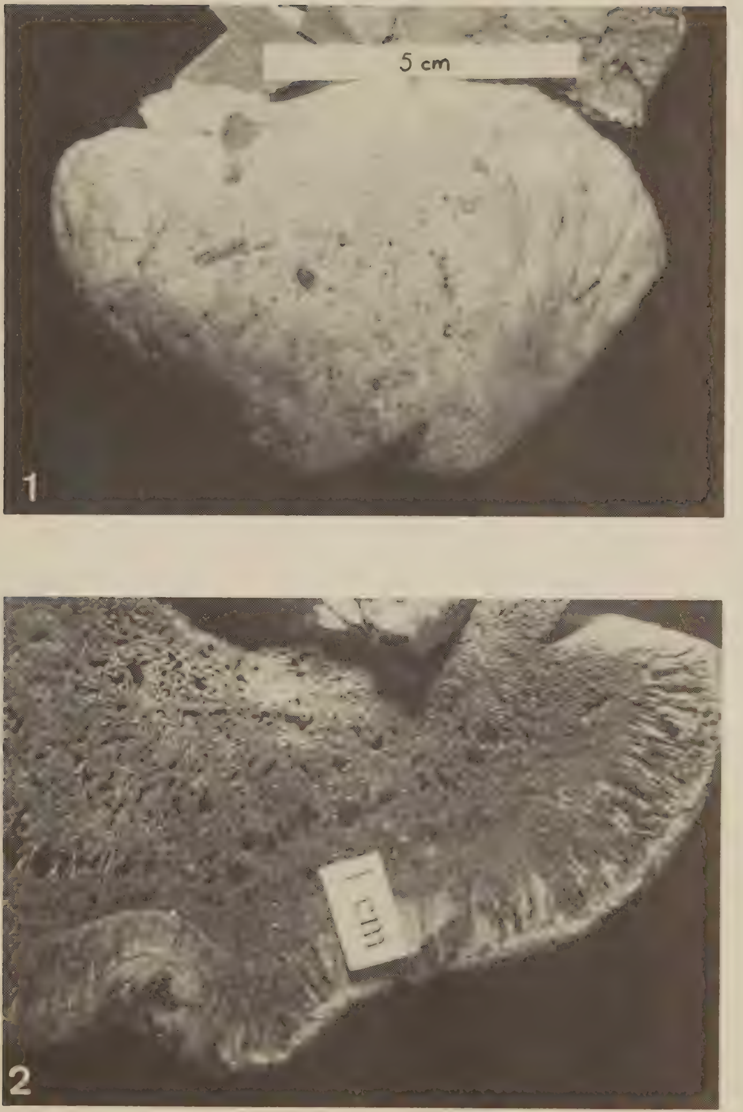
Basidiocarp annual, pileate, broadly attached, up to 13.5 long, 8.7 cm wide and 2.6 cm thick at the base, soft and fleshy when fresh, lightly of weight and fragile when dry. Upper surface very pale yellow (8/4 10YR), yellow (8/6, 7/8 10YR) to reddish yellow (6/8 7.5 YR), glabrous, azonate (Fig. 1). Pore surface reddish yellow (6/8 7.5YR) to strong brown (5/8 7.5YR) coloured, pores round to angular, 1-2(-3) per mm (in the poroid areas), dissepiments thin and partly/lacerate in the margin (Fig. 2). Tubes very pale yellow (7/4 10YR) in the holotype up to 1.3 cm deep. Context lighter than the tubes, very pale yellow (8/4 10YR), soft and cottony, up to 1.3 cm thick.

Hyphal system monomitic, generative hyphae with scattered clamps, hyaline and thin-to very thick-walled, 3-8 µm wide, very sparingly branched and segments of up to 400 um seen without a clamp, non-dextrinoid. The long segments without clamps may be interpreted as intercalary skeletal hyphae but since there are even transitions from the most delicately thin-walled hyphae to wide and almost solid ones, we interpret the thick-walled hyphae as so called sclerified generative hyphae. Hyphae with amorphous contents, 4-4.5 µm, in the context. Pilear cover hyphae, 3-4.5µm with amorphous contents. Cystidia and other sterile hymenial elements not seen. Basidia clavate, 8-12 x 4-5 µm with 4 sterigmata and a basal clamp. Basidiospores subcylindrical to broadly ellipsoid, 3-3.5 (-4) x 2-2.5 µm, slightly asperulate and strongly amyloid (Fig. 3).

Substrata: Known only from an unidentified hardwood tree (Dicotyledoneae).

Distribution: Known only from the type locality.

Remarks: The species is recognized by the large, fleshy, pale ochraceous basidiocarps, fairly large pores, lacerate in the margin; its monomitic hyphal system with strongly variable width and wall thickness besides the subcylindrical amyloid spores. *W. cremea* Ryv, also a ochraceous pileate species described from Brazil is separated by almost globose spores and dextrinoid skeletal hyphae.



Figs. 1-2. *Wrightoporia porilacerata*: 1. upper surface of basidiocarp; 2. pore surface of basidiocarp showing pore-lacerate aspect.

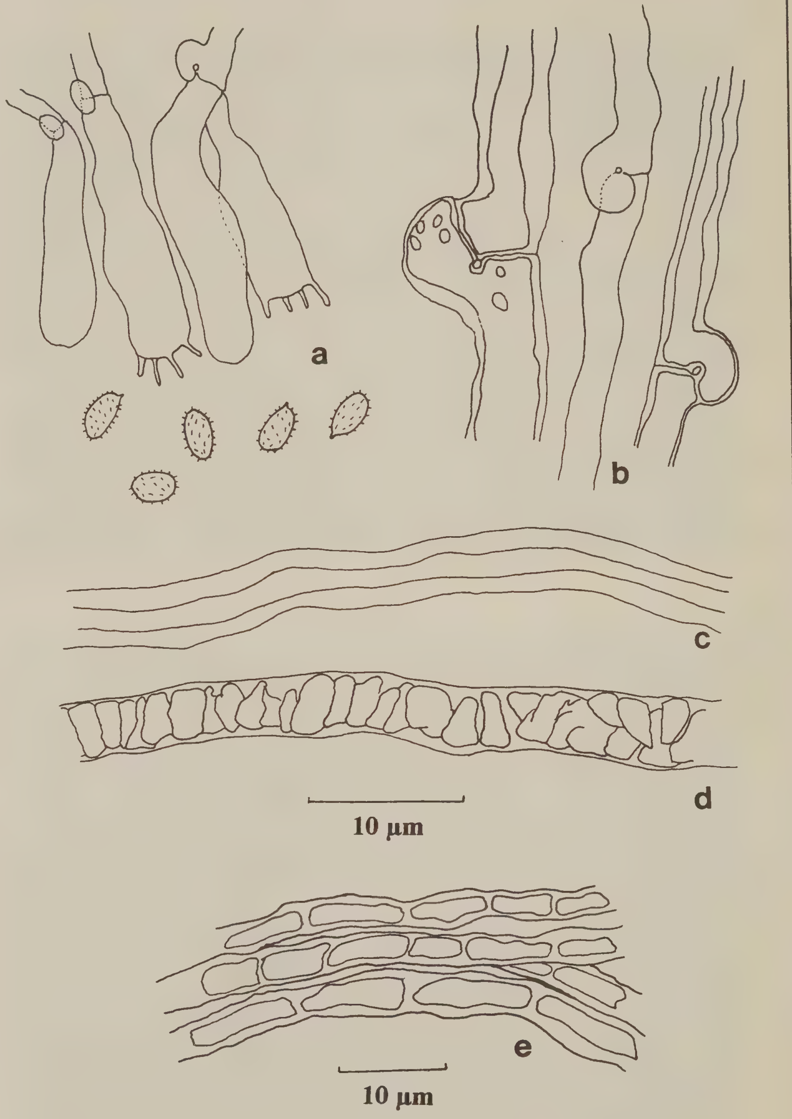


Fig. 3. *Wrightoporia porilacerata*: a. basidia, basidioles and spores; b. thin- and thick-walled generative hyphae; c. segments without clamps of sclerified generative hyphae; d. hyphae with amorphous contents; e. pilear cover hyphae with amorphous contents.

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A SHORT NOTE ON THREE CRITICAL CORYNEUM SPECIES: CORYNEUM POPULINUM, C. ELONGATUM AND C. CORNI-ALBAE[1]

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Abstract: Two of Bresadola's *Coryneum* species, *C. populinum* Bres. and *C. longestipitatum* Berl. & Bres. and one from Roumeguère's *Fungi Gallici Exsiccati* (*Coryneum corni-albae* (Roum.) Sacc., were reported by SUTTON (1975) as not available either in **PAD** or **TN**. However a specimen of *C. populinum* was found at MI, and it is quite possible that it might represent the **holotype.** Two other specimens of a Bresadola *Coryneum* (*C. elongatum* n.sp.) at **MI** and at **PAD**, are, respectively,the **neotype** and the **isotype** of *C. longestipitatum* Berl. & Bres. In the same mycologycal collection at **MI**, a specimen of *Sphaeria corni-albae* Roum. was also found, which allowed the comparison with the **holotype** of *Coryneum corni-albae* (Roum.) Sacc. at **PAD**. The binomials *Sporocadus populinus* (Bres.) comb.nov., *S. longestipitaus* (Berl.& Bres.) comb. nov., and *S. corni-albae* (Roum. ex Sacc.) comb. nov., are here proposed.

KEY WORDS: G.Bresadola, A.N. Berlese, *Coryneum*, *Sporocadus.*

While reorganizing the historical collections of the *Herbarium Universitatis Mediolanensis* (**MI**) one of us (M.O.) chanced to re-discover at the side of some important historical commercial mycological collections (Roumeguère's *Fungi Gallici Exsiccati*, De Thümen's *Mycotheca Universalis*, C.R.Shear's *New York Fungi*, Kellerman & Swingle's *Kansas Fungi*, D.Saccardo's *Mycotheca Italica*, Cavara's *Fungi Longobardiae exsiccati*, Briosi & Cavara's *Funghi parassiti delle piante coltivate ed utili essiccati,* De Notaris et al.'s *Erbario*

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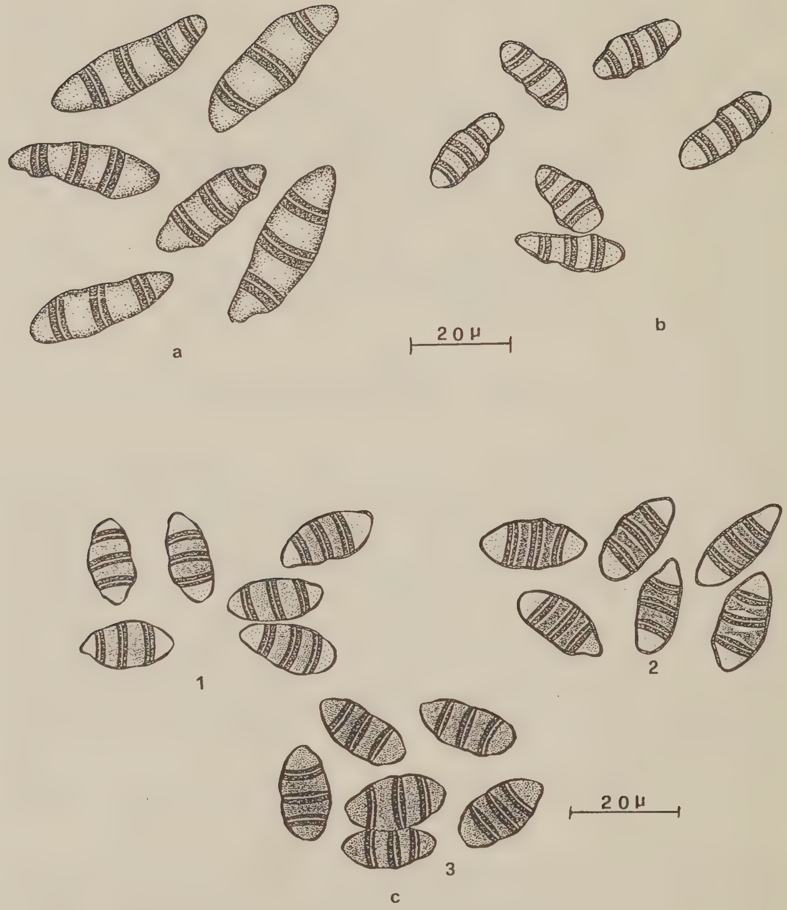

Fig. 1: a) *Sporocadus populinus* (Bres.) comb.nov., holotype at **MI**; b) *Sporocadus longestipitatus* (Berl. & Bres.) comb.nov., holotype at **MI**; c) *Sporocadus corni-albae* (Roum.ex Sacc.) comb.nov.: 1) holotype at **PAD**, 2) ?isotype at **MI**, 3) ?isotype at **RO**.

Crittogamico Italiano, 1st and 2nd series) the believed lost Mycological Herbarium of **A.N. Berlese** (1864-1904). STAFLEU & COWAN (1976) under the lemma "Berlese" report the entry " HERBARIUM and TYPES : PAD (?)" but if on the one hand it is true that Berlese worked for most of his life with P.A.Saccardo in Padua one should remember that from 1899 until his death he was appointed as full professor of Plant Pathology at the Royal High School of Agricolture in Milano. Later, this became the Universitas Studiorum Mediolanensis (University of Milan) in 1924 and his mycological herbarium was there left, even if forgotten.

The herbarium is in very good condition, and is now being reassembled on up-to-date systematic and taxonomic criteria. Among the specimens, two of them, both autographed by Bresadola, seemed particularly worthy of mention: *Coryneum populinum* Bres., and *Coryneum elongatum*

Moreover, in Roumeguère's *Fungi Gallici Exsiccata* was found the specimen n. 571, classified as *Sphaeria corni-albae* Roum., then transferred by Saccardo to *Coryneum corni-albae* (Roum.) Sacc..It was particularly interesting, since SUTTON (1975) was not able either to obtain from PAD the holotype, or study specimens without "large prickles on the stems".

Coryneum populinum Bres.: the specimen in the Berlese's herbarium has the following information: "Coryneum populinum n. sp., an satis distinctum a C. intermedio Sacc.? Ad cortice Pop.albae. Aprili 1888, leg.G.Bresadola" and shows a pencil drawing with a four-celled conidium "sp.25-32x10" . The species was described by BRESADOLA (1892) as: "Acervuli innato-erumpentes, subcirculares, atri, applanati, 1-2 mm. lati, epidermide irregulariter rupta cincti; conidia subfusoidea, vel subelliptica, laete lutea, 3-septata, ad septa constrincta, 25-32 x 9-11; basidia filiformia, hyalina, 30-40 mmm. longa. Per annum, in cortice truncorum *Populi nigrae* in agro Tridentino parce obvium.". The same description is reported by SACCARDO (1895), and by SUTTON (1975), who adds: "No material was available in **PAD** or **TR**." . This taxon is not, actually, reported in GOLA's Catalogue (1930) and SACCARDO's herbarium, and no specimen is held either at **PAD** or at **TN** (TISI, 1996), or in the Trento Diocese Museum, where a large part of the "*Herbarium Bresadolianum*" is kept (BONINSEGNA, 1996). Although the habitat on the label is slightly different (*Populus alba*) from that described in Bresadola's diagnosis (*Populus nigra*) our personal opinion is that it does represent the **holotype**.

Our measurements of spore sizes gave 23-34 μ (X= 31μ) x 9-12μ (X= 10μ). This matches with *Coryneum pezizoides* Ell. & Everh., transferred to *Seimatosporium pezizoides* (Ell. & Ev.) Sutton by SUTTON, 1975. MORELET (1985) (reported by NAG RAJ, 1993) transferred *Seimatosporium pezizoides* to *Sporocadus pezizoides* (Ell. & Ev.) Morelet. Although *Coryneum pezizoides* Ell.& Ev., was originally described from *Salix*, the fact that the type of *C. populinum* is on *Populus* is quite significant, since the host plants are in the same family. Since the epithet *populinum* (1892) predates *pezizoides* (1897) the following binomial and its synonymies are therefore proposed:

Sporocadus populinus (Bres.) comb.nov.

Coryneum populinum Bres., Fungi Tridentini novi, vel nondum delineati descripti et iconibus illustrati, **2**: 46, 1892
Coryneum pezizoides Ell. & Ev., Bull. Torrey bot. Cl., **24**:292, 1897
Seimatosporium pezizoides (Ell. & Ev.) Sutton, Mycol. Pap.,**138**: 155, 1975
Sporocadus pezizoides (Ell. & Ev.) Morelet, Ann.Soc.Sci.nat.Archeol.Toulon & Var, **37:** 234, 1985.

SPECIMENS EXAMINED

Coryneum populinum Bres., holotype in (**MI**), on bark of *Populus alba*, collected and classified Bresadola, April 1888; isotype from the holotype as slide by B.C.B.Sutton, deposited at **MI.**

Coryneum elongatum n.sp.: In the **MI** specimen Bresadola describes the species as follows: "Coryneum elongatum n.sp. affine C. Corni-albae et forsan tantum eius var.. sporis 3 sept. 20-23 x 7-8 stipis hyalinis. In ramis Pyri communis, Magras, Aut(umn) 1882. Leg. G.Bresadola". On the label of a second specimen in **PAD** is written: "*Coryneum elongatum* Bres. n.sp.; Conidia 3 sept. fusca 20-23 x 7-8 μ stipis hyalinis filiformis. In ramis *Pyri communis* in reg.e Tridentina. Leg. G.Bresadola". This specimen was reported in GOLA's catalogue (1930) as *Coryneum elongatum* Bres, **isotype** (*cT! = co-typus*), and the specimen at **MI** should therefore be considered the **holotype**. However this species was never accompanied by any description by Bresadola, nor by Berlese, and was not reported in the Sylloge. Neither was it reported among Saccardo's Omissions by KIRK (1985). Therefore it must be considered a *nomen nudum.*

Coryneum longestipitatum Berl. et Bres., described by BERLESE & BRESADOLA (1889) is a species that may easily be identified with the former. This fungus was described as follows "Stromatibus sparsis, epidermide primo tectis, dein ea laciniatim fissa, emergentibus, atris 1\2-1 mm. longis, irregularites elongatis vel subrotundis; conidiis copiosissimis, ovoideis, transverse 3-septatis, loculis omnibus aeque coloratis, ad septa non vel vix constrictis, luteo-fuscescentibus, 18-20 x 8-9; basidiis longissimis, 40-60 x 2, hyalinis, continuis. Habitat *in ramis* Piri communi "Magras, Trento" and add "La specie più affine è il *Coryn. Corni-albae* del Saccardo, ma i basidii sono più brevi, e gli stromi gregarii in quest' ultima specie ci impediscono di stabilirne l'identità" (the more similar species is Saccardo's *Coryn. Corni-albae*, but basidia (the obsolete term for *conidiophores*) are shorter and the gregarious stromata of the latter hinder any possible identity).

In SACCARDO (1892, pag.481) the species is described as having "stromatibus sparsis, epidermide primo tectis, dein ea laciniatim fissa, emergentibus, atris, 0,5-1 mm. long., irregulariter elongatis vel subrotundis; conidiis copiosissimis, ovoideis, transverse 3-septatis; loculis omnibus aeque coloratis, ad septa non v.vix contrictis, luteo-fuscescentibus, 18-20 x 8-9; basidiis longissimis, 40-60 x 2. Hab. in ramis Pini (mispelled for Pyri) communis, Magras Trento. - *C. Corni-albae* affine.".

SUTTON (1975) quotes in full, for this taxon, the description by BERLESE & BRESADOLA (1889) and adds: "No material was available in PAD or TR.". No exsiccata either of *Coryneum elongatum* Bres. or of *Coryneum longestipitatum* Berl. et Bres. are, in fact, held at **TN** (TISI, 1996), or at the Trento Diocese Museum (BONINSEGNA,1996). The taxon *Coryneum longistipitatum* Berk. reported in GOLA's Catalogue (1930) is certainly a mispelling of the autographed wording by P.A. Saccardo *Coryneum longistipitatum* Berl.et Bres. Anyhow, this specimen was collected by Fautrey on *Pyrus communis*, in the Cotè d'Or, xii 1899, with conidial sizes of 16-17 x 5,5-7μ and "basidia" 30-40 x 1,1\2 μ, and therefore it is later and has spores somewhat smaller (our spore measurements were 12-19μ (X= 15μ) x 5-8μ (X= 6μ)).

In our personal view these entries seem to be very important: nowhere has a written diagnosis for *Coryneum elongatum* been so far found; all the descriptions of *C. longestipitatum* overlap with those of *C. elongatum*; both present very close affinity with *C. corni-albae;* both were found in Magras, near Trient, in the same years. It seems a likely explanation that Berlese and Bresadola, while writing their diagnosis, had changed the name of their fungus species from *C. elongatum* into *C. longestipitatum* without correcting the names on the labels. From all this it follows that *Coryneum elongatum n. sp.* at **MI** should be accepted as **neotype** of *Coryneum longestipitatum* Berl. & Bres, the specimen of *Coryneum elongatum Bres.*, at **PAD**, representing its **isotype**.

Our measurements of spore sizes gave 14-20μ (X= 18μ) x 6-9 μ (X= 6μ). The examination of this material confirmed SUTTON's suggestion (1975) that the species is the same of *Seimatosporium cassiopes* (Rostrup) B. Sutton. MORELET (1985) (reported by NAG RAJ, 1993) transferred it to *Sporocadus cassiopes* (Rostrup) Morelet. Although the epithet *elongatum* antedates both *cassiopes* and *longestipitatum*, it is a *nomen nudum*, and therefore the following synonymy is proposed:

Sporocadus longestipitatus (Berl. & Bres.) comb.nov.

Coryneum elongatum n.sp. (nomen nudum), 1882
Coryneum longestipitatum Berl. & Bres., Annuario Soc.Alpinisti Tridentini **1887-88**: 103, 1889.
Coryneum cassiopes Rostrup, Rept.Second Norwegian arctic Exped.Fram., 9, 1906
Coryneum sorbi Pk., N.Y.St.Mus.Bull.**1911**: 109, 1912
Coryneopsis cisticola Bausà Alcade, An.Jard.bot.Madr., 7: 497, 1948
Seimatosporium cassiopes (Rostrup) Sutton, Mycol. Pap., **138**: 76, 1975
Sporocadus cassiopes (Rostrup) Morelet, Ann.Soc.Sci.nat.Archeol. Toulon & Var., **37**:234, 1985.

SPECIMENS EXAMINED

Coryneum elongatum n.s., holotype., on *Pyrus communis,* leg. G.Bresadola, 1882, in **MI ;** *Coryneum elongatum* Bres., n.sp., isotype, on *Pyrus communis*, leg.G.Bresadola, 1882, in **PAD,** *Coryneum longistipitatum* Berl.et Bres., legit Fautrey, on *Pyrus communis,* Cote d' Or, xii 1899, at **PAD**; isotype as slide from the holotype by G.B.Sutton, deposited at **MI.**

Coryneum corni-albae Sacc.: Roumeguère included this species in *Fungi Selecti Gallici* (*Fungi Gallici Exsiccati*) as n.571, with the binomial " *Sphaeria* *corni-albae* spec.nov. (non *Sphaeria corni* Sow.)" (1878), without any description. SACCARDO illustrated (1882) and described it (1881) with the following diagnosis "Acervulis gregariis inato-erumpentibus, pulvinatis, 1/2-1 mill. d., denique epidermide rupta cinctis; conidiis oblongis utrinque acutiusculis, 20-22 × 9, triseptatis, non constrictis, totis fuligineis, basidiis filiformibus 18 -20 × 1 suffultis. - In ramis Corni albae emortuis, *Perpignan*, Sept. 1878.

SUTTON (1975), based on Saccardo's description, argued that the species might belong to *Seimatosporium*, but he was unable to study the Saccardo's holotype in **PAD**, and the sample of the Roumeguère's *Fungi Selecti Gallici* n. 571 which he did examine presented large prickles on the stems, and therefore the host was not *Cornus*, but either *Rosa* or *Rubus*. Fortunately for us, we were able to obtain from **PAD** the holotype, and to compare it with the sample in **MI** and with another specimen of Roumeguère' *Fungi Gallici Exsiccati* n.571 from **RO**. None of them had prickles, all had opposite leaves as in *Cornus*, and our spore measurements gave, for all them, a size of 19-22 μ (X = 17-20 μ) × 8-10 μ (X = 8-9 μ) triseptate, which is in agreement with Saccardo's measurements. The pale brown conidia, with apical and basal cells acute, place it certainly in *Seimatosporium*. However *Coryneum corni-albae* does not not agree with any species currently belonging there.

NAG RAJ (1993) clearly separates *Seimatosporium* from *Sporocadus*, the generic name of *Seimatosporium* being limited to coelomycetes that have a mixture of appendaged and non of appendaged conidia, while *Sporocadus* is restricted to the species characterized by one type conidium lacking appendages. On this basis the following binomial and synonymies are therefore proposed:

Sporocadus corni-albae (Roum. ex Sacc.) comb.nov.
Sphaeria corni-albae Roum., nomen nudum, 1878
Coryneum corni-albae (Roum.) Sacc., Michelia, **2**: 355, 1881
Leptocoryneum corni-albae (Sacc.) Petrak, Hedwigia **65**: 278, 1925
Coryneopsis corni-albae (Sacc.) Grove, J.Bot., Lond., **70**: 34, 1932

SPECIMENS EXAMINED

Sphaeria corni-albae Roum., *Fungi Selecti Gallici* n. 571, holotype corrected by P.A.Saccardo as *Coryneum corni-albae* (Roum.) Sacc. in **PAD**; ?isotype as *Sphaeria corni- albae* Roum., ex *Fungi Selecti Gallici*, n. 571, in **MI**; ?isotype as *Sphaeria corni-albae* Roum., ex *Fungi Selecti Gallici*, n. 571, in **RO**; isotype as slide by Sutton of the holotype of *Coryneum corni-albae* (Roum.) Sacc. in **PAD**, deposited at **MI**.

ACKNOWLEDGMENTS

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MYCOTAXON

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MONOCILLIUM LIGUSTICUM, A NEW SPECIES FROM MYCORRHIZAL ROOTS IN MEDITERRANEAN NORTH ITALY

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ABSTRACT

Monocillium ligusticum, sp. nov., isolated from mycorrhizal roots of two different Mediterranean plants in Liguria, North Italy, is described. This *Monocillium* is characterized by soft sclerotioid masses, often dominating colony appearance, sometimes consisting of discrete masses, but mostly confluent in wide sclerotial plates. The shape and size of its phialides and conidia bring it close to *M. tenue* W. Gams.

During 1993, in the course of an investigation on microfungi associated with ectomycorrhizae of *Pinus halepensis* Mill. in Liguria, North Italy, unusual *Monocillium* isolates were obtained from *P. halepensis* mycorrhizae (Girlanda & Luppi-Mosca, 1995). Later (1996), during a continuing study of microfungal populations associated with mycorrhizal roots of different Mediterranean plants, the same fungus was isolated from *Erica arborea* L. ericoid mycorrhizae collected in another location in Liguria. Following detailed examination it is believed that all these isolates represent a hitherto underscribed species of *Monocillium*.

MATERIALS AND METHODS

Details of isolation from both serially washed and serially washed plus H_2O_2-sterilized ectomycorrhizae of *P. halepensis* are given in Girlanda & Luppi-Mosca (1995). Isolation from *Erica arborea* ericoid mycorrhizae was carried out by means of NaOCl sterilization and homogenization techniques described in Perotto *et al*. (1996).

Colonies are described from growth on 2 % malt agar (MA), oatmeal agar (OA), cornmeal agar (CMA), all as described in Smith & Onions (1992), and potato dextrose agar (PDA, Oxoid). Cultures from 4 mm diam mycelial disks cut from the margins of actively growing colonies were grown in 9 mm diam Petri dishes at room temperature in normal day and night rhythm, and the linear growth was measured after ten days. Colony colours were expressed, whenever possible, by reference to Rayner (1970). Microscopical observations were made on water mounts of colonies, or on slide cultures with a thin layer of the agar media incubated in a moist chamber. The length/breadth ratio (L/B) was calculated for the conidia.

DESCRIPTION

Monocillium ligusticum Girlanda et Luppi-Mosca, sp. nov.

Coloniae in agaro MA post 10 dies 19-26 mm diam, planae vel radiatim sulcatae, siccae sed nonnunquam mucidae ex aliqua parte, pulverulentae - granulosae - minute floccosae vel irregulariter lanosae - leniter funiculosae, margine integro vel fere integro, primum albae vel albidae, nonnunquam dilute rosatae, deinde nigrescentes - omnino minutis structuris sclerotialibus fuscatae. In aliquibus coloniis exsudatum hyalinum interdum modice effusum. Reversum stramineum - ochraceum, fuscum infra structuras sclerotiales.

Coloniae in agaro PDA 17-23 mm diam, contextu saepius funiculoso.

Coloniae in agaro OA 22-28 mm diam, mycelio saepe in lobulos induente.

Coloniae in agaro CMA 26-30 mm diam, tenuissimae et perlucidae, sparsis structuris sclerotialibus colore olivaceo; reversum sine colore.

Sporulatio nematogena - synnematogena (phalacrogena in CMA), phialides (35-) 40-70 (-140) μm longae, e ca. 2 μm ad ca. 1 μm gradatim attenuatae, saepe ultra dimidiam longitudinem crassitunicatae.

Conidia hyalina, laevia, capitulis mucidis connexa, cylindrica (raro ellipsoidea), (4-) 5-6 (-7) x 2 (-3) µm, L/B (1.8-) 2.5-3.5 (-4).
Structurae sclerotiales plus minusve copiosae, e cellulis subglobosis primum hyalinis demum brunneis constitutae, discretae sed plerumque crustam efformantes.
Holotypus CBS 684.95.

Colonies on MA 19-26 mm diam after ten days, plane or radially or irregularly sulcate, dry but with moist areas in some isolates, powdery to granular to minutely floccose or irregularly lanose to slightly funiculose; margins low, entire or nearly so, colourless; colourless exudate sometimes produced in a limited amount; conidiogenesis abundant, at first white to whitish sometimes with a rosy tinge, then darkening in a sectorial or annular or irregular pattern, till almost entirely dark, due to the appearance of minute soft sclerotioid masses; reverse in yellowish shades near Pale Luteous (R. 11) to Ochreous (R. 44), but dark near Fuscous Black (R. 104) underneath the sclerotioid masses.

Colonies on PDA 17-23 mm diam, similar in appearance to those on MA except for slightly more funiculose growth.

Colonies on OA 22-28 mm diam, similar in appearance to those on MA, often with a petaloid pattern of growth.

Colonies on CMA 26-30 mm diam, very thin and persistently uncoloured, with sparse olivaceous sclerotioid structures; reverse nonpigmented.

Phialides nematogenous to synnematogenous (phalacrogenous on CMA), (35-) 40-70 (-140) µm long, *ca* 2 µm wide at the base, gradually tapering in the upper, thin-walled part to *ca* 1 µm, with the thick-walled part extending to the middle or up to two thirds of the total phialide length (Figs. 1, 2).

Conidia hyaline, smooth, in slimy heads, cylindrical (rarely ellipsoid), (4-) 5-6 (-7) x 2 (-3) µm, L/B (1.8-) 2.5-3.5 (-4) (Figs. 1, 2).

Sclerotioid structures produced in a variable amount, initiated by the aggregation of subglobose pseudocells (*ca* 4-8 µm diam) at first hyaline, then pigmented, discrete (up to 85 µm diam) but mostly confluent in wide plates (Figs. 1, 3).

Holotype: CBS 684.95 (dried and living culture), from serially washed plus H_2O_2-sterilized ectomycorrhizae of *Pinus halepensis* Mill., *P. halepensis* forest, 200 m alt., Varigotti, Liguria, Italy, September 1993; ex-type living cultures maintained at the Laboratorio di Micologia del Dipartimento di Biologia Vegetale dell' Università di Torino, Italy (CLM 307.93).

Other isolates examined: CBS 683.95 (= CLM 305.93), from serially washed ectomycorrhizae of *Pinus halepensis* Mill., *P. halepensis* forest, 200 m alt., Varigotti, Liguria, Italy, September 1993; CLM 306.93, from serially washed plus H_2O_2-sterilized ectomycorrhizae of *Pinus halepensis* Mill., *P. halepensis* forest, 200 m alt., Varigotti, Liguria, Italy, September 1993; CLM 111.96, from NaOCl-sterilized ericoid mycorrhizae of *Erica arborea* L., *Quercus ilex* L. forest, 300 m alt., Borgio Verezzi, Liguria, Italy, June 1996.

Teleomorph: unknown.

Etymology: *ligusticum* = Ligurian, referring to the geographic origin of the isolates.

Habitat: ectomycorrhizae of *Pinus halepensis* and ericoid mycorrhizae of *Erica arborea*.

Known distribution: Liguria, North Italy.

DISCUSSION

The fungus clearly belongs to the genus *Monocillium* S. B. Saksena. The genus was erected in 1955 to accommodate the single species *M. indicum* Saksena, and was conceived as being characterized by "simple, unbranched conidiophores consisting of a single phialide supported on a long pedicel" (Saksena, 1955). Barron (1961) added a second species, *M. humicola*, and Christensen & Backus (1964) described a new variety of the latter, *M. humicola* var. *brunneum*. A third species, *M. exsolum*, was described by Batista & Heine (1965). Later, Barron (1967) regarded *M. exsolum* as a *Metarhizium*, probably *M. anisopliae* (reidentified at CBS as *M. anisopliae* var. *anisopliae*, ex-type = CBS 431.64); furthermore, he recognized *M. humicola* as conspecific with *Torulomyces lagena* Delitsch (Delitsch, 1943), raising the question of the relationship between *T. lagena* and *M. indicum* and the possible inclusion of *Monocillium* in *Torulomyces* (Barron, 1967, 1968). Based on time-lapse photomicrography observations of conidium ontogeny in *T. lagena* and *M. indicum*, Hashmi *et al.* (1971) considered the two species to be congeneric, and accordingly transferred *M. indicum* to *Torulomyces*. In his survey of phialidic genera close to

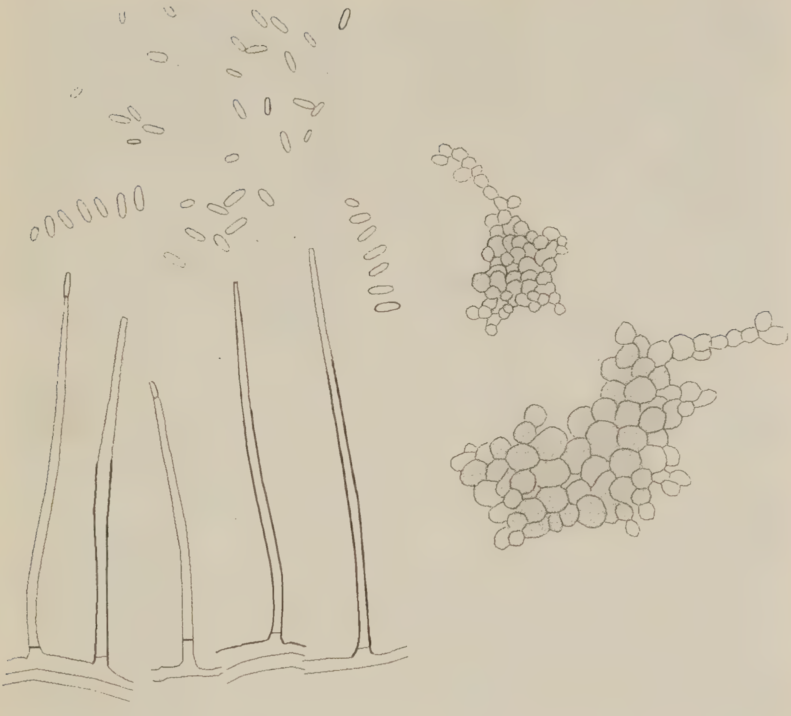

Fig. 1 - *Monocillium ligusticum*: phialides, conidia and sclerotioid structures.

Cephalosporium, Gams (1971) maintained *M. indicum* Saksena and introduced the new species *M. tenue*, *M. arctiicola*, *M. dimorphosporum, M. loricatum*, *M. constrictum*, *M. mucidum* and the new combinations *M. granulatum* and *M. nordinii*. He defined *Monocillium* as being characterized by phialides consisting of a slender, basal portion with obviously thickened walls, sometimes with a swollen, vesicle-like middle portion and a narrow apex (Gams, 1971), and distinguished *Monocillium* from *Acremonium* by the basal thickening of the phialide walls and from *Torulomyces* by disconnected conidial chains or heads. This view was maintained in Domsch *et al.* (1980). On the other hand *T. lagena* has a teleomorph in

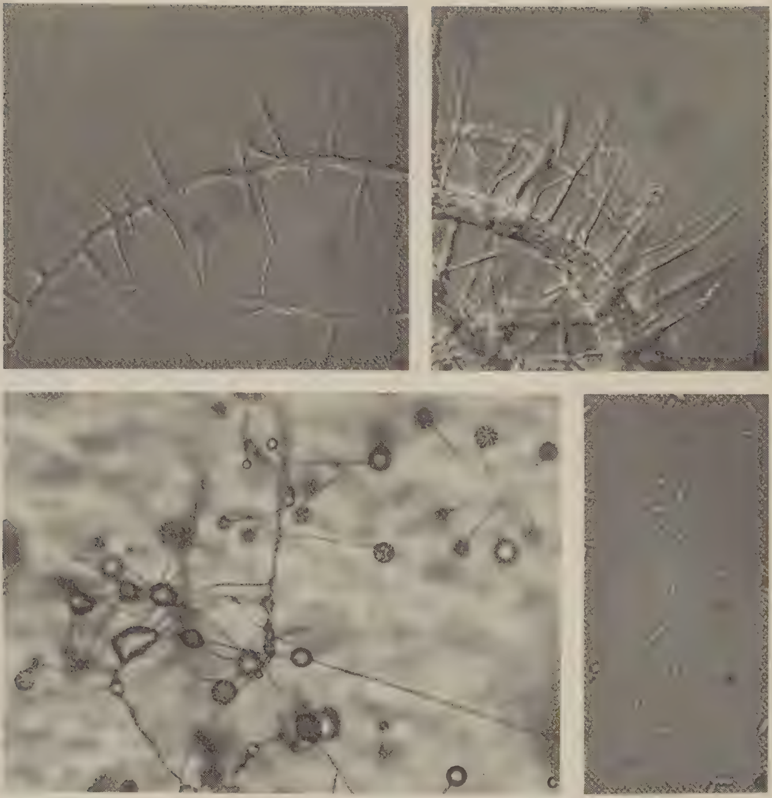

Fig. 2 - *Monocillium ligusticum* (CBS 684.95): a, b, phialides (275 ×); c, undisturbed conidial heads (140 ×); d, conidia (435 ×).

Eupenicillium, *E. limoneum* Gochenaur & Zlattner (Stolk & Samson, 1983), and *Monocillium* has *Niesslia* teleomorph (Niessliaceae, Hypocreales) (Gams, 1971). In the last edition of the Ainsworth & Bisby 's Dictionary of the Fungi (Hawksworth *et al*., 1995) the genera *Monocillium* and *Torulomyces* are kept as separate.

According to the Dictionary (Hawksworth *et al*., 1995), *Monocillium* comprises *ca* 15 species, widespread. Gams (1971)

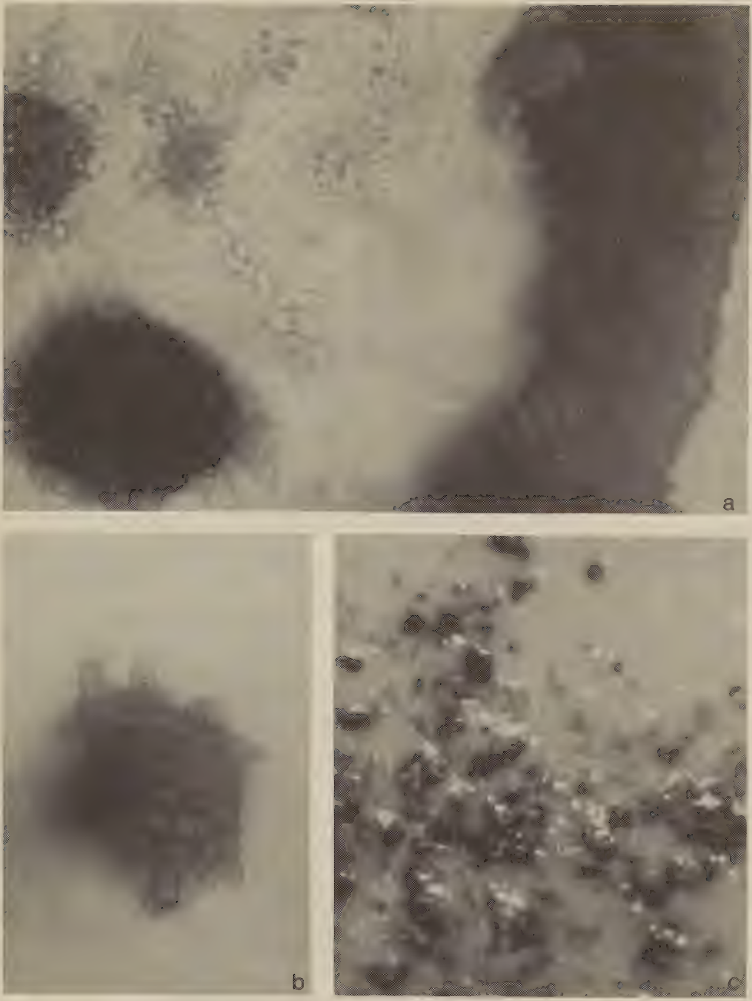

Fig. 3 - Developmental stages of sclerotioid structures of *Monocillium ligusticum* (CBS 684.95): aggregation of subglobose pseudocells, single masses and sclerotial plates (a, 325 ×; b, 510 ×; c, 20 ×).

provided descriptions and a key to 12 species. Based on teleomorph connections, the species concepts are drawn along narrow lines (Gams, personal communication). Among the species with phialides exceding 45 µm in length and conidia in heads, *M. ligusticum* is very close to *M. tenue* W. Gams based on the shape and size of both phialides and conidia. However, colonies of *M. tenue* reach 7-10 mm diam in ten days while those of *M. ligusticum* spread faster on all tested media, fan-shaped crystals, regularly produced by *M. tenue*, were never observed in cultures of *M. ligusticum*, and *M. tenue* does not produce sclerotioid structures. The most distinctive character of *M. ligusticum* is indeed the presence of soft sclerotioid structures, often dominating colony appearance, sometimes consisting of single masses, but mostly confluent in wide sclerotial plates. Of the known *Monocillium* species, only *M. bulbillosum* W. Gams produces black sclerotial structures, but, based on Gams' description, the dark structures of *M. ligusticum* differ from those of *M. bulbillosum* in being confluent and not bulbillose; furthermore the phialides and conidia of *M. bulbillosum* are much shorter: the phialides are 17-40 (-55) µm long and the conidia measure 2.9-3.5 × 1.8-2.1 µm, with L/B ratio 1.5-1.8.

The ecological attributes of *M. ligusticum* also are rather distinctive. The known *Monocillium* species have been isolated from soil, various vegetal substrata such as xylem of dead or living plants, bark, dead leaves, or fruits, and fungal substrates (Gams, 1971). *M. tenue* was reported from several macrofungi (Gams, 1971); *M. nordinii* was isolated from *Armillariella mellea* rhizomorphs (Gams, 1971), and was able to parasitize pine stem rust fungi (Tsuneda & Hiratsuka, 1980). *M. mucidum* was able to decompose xylan and cellulose and to cause severe injury to pea roots *in vitro* (Domsch *et al.*, 1980). *M. ligusticum* was associated with mycorrhizal roots of two different plants from two locations in Liguria. Colonization of living mycorrhizal roots by microfungi could be linked to controlled phytopathogenic or mycoparasitic capacities, possibly allowing some avirulent penetration into the roots, and/or the ability to use complex substrata available in the fungal sheath but not released into the rhizosphere (Girlanda & Luppi-Mosca, 1995). The genus *Monocillium* is not reported as typically linked to roots, yet *Monocillium* seems to possess the above-described ecological attributes of rhizoplane fungi.

ACKNOWLEDGMENTS

This work was supported by a grant from Ministero dell' Università e della Ricerca Scientifica e Tecnologica (M.U.R.S.T. 40 %) and by Centro di Studio sulla Micologia del Terreno del C.N.R.

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FUNGI ON EPIFAGUS (OROBANCHACEAE) I. ON SCLEROTIUM OROBANCHES AND ITS PHOMA SYNANAMORPH

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ABSTRACT

Sclerotium orobanches, described on the roots and stems of *Epifagus virginianus* in North America in 1822, was sanctioned by Fries in the same year; Fries recorded it in 1828 from Scania (Sweden) and Germany on *Orobanche major.* We have recollected this apparently rare fungus in New York, describe its microanatomy, and briefly note here its synanamorph, an as yet apparently undescribed species of *Phoma,* found both in nature and produced in culture.

The Orobancaceous *Epifagus virginianus* (L.) W. P. C. Barton, "beech drops," is a not uncommon, achlorophyllous plant on the forest floor, parasitic on the roots of *Fagus grandifolia* Ehrenb. Both plants are distributed from New Brunswick to Ontario, Canada, to Wisconsin, and southwest to Florida, Mississippi, and Louisiana, but rare on the Coastal Plain (Wiegand & Eames, 1926). Surprisingly enough, no records of any fungi on this host appear in Seymour's (1929) host index, nor in either of the USDA host indices (Anon, 1960; Farr & al., 1989), nor in the Canadian host index (Conners, 1967). On a field trip to the Lloyd-Cornell Preserve, Ringwood, New York, we collected ample material of this host plant bearing two different fungi, one an undescribed species of *Crocicreas* Fr. (Helotiales) (Iturriaga & al., 1998), the other a species referable to *Sclerotium* Tode. The latter may well be endophytic, since its black, often irregularly shaped sclerotia for the most part are erumpent from the stem tissues and from the floral parts, though some sclerotia appear to form on the plant surfaces.

This *Sclerotium* species was described by Schweinitz (1822) from North America as *Sclerotium orobanches* Schwein., using the host name *Orobanche virginiana* L., an earlier synonym of *E. virginianus.* Schweinitz sent material to Fries, in Sweden, who indicated in his sanctioning work (Fries, 1822) that he had seen only that dried material. Six years later Fries (1828) reported Schweinitz's species on *Orobanche major* L. in Skåne (= Scania, in Sweden) and in Germany.

The fungus appears to be very rarely collected, for we find only one additional published record of its collection in North America (Peck, 1869), other than Schweinitz's (1832) later compilation, even in the usually complete host indexes cited above. The indexes of *Journal of Mycology, Mycologia,* and of *Mycotaxon* similarly provide no records. There was only one specimen of this species on that host in our herbarium (CUP), collected by C. H. Peck, and the only material of this species on deposit at BPI is in their portion of the Schweinitz herbarium. There are four previously unreported collections on deposit at NY, which we have examined and record here. Two additional unreported collections are on deposit in DAOM, from Ontario, Canada, and from New York, and one in NYS from New York.

For an easily recognizable fungus which Schweinitz claimed to be "frequent," and which certainly is fairly common in the late summer and early autumn in our area, it is surprising that there appear to be no literature reports on its collection since 1869. It was not ignored in the European literature, as appears to be the case for North American literature, but only Fries's collections seem to be recorded (Rabenhorst, 1844; Saccardo & Sydow, 1899; Lindau, 1909 [who cited Denmark as a collection site, but presumably this is Fries's reference to "Scania"]; Oudemans, 1923). The only material at UPS is that which Schweinitz had sent to Fries, who apparently failed to deposit his European collections in his herbarium (R. Moberg, *pers. comm.*). No additional European collections or references in the literature from either continent are known to us.

Schweinitz's original description and Fries's redescription of American material are excellent matches for the material we have collected, both emphasizing the great variability in shape (from oblong to contorted, lobed, or vermiform, occasionally confluent and becoming quasi-reticulate). Both note that the sclerotia may be superficially tuberculate (rugulose). Schweinitz indicated that it occurs on the roots and stems of the dead host plant. His collections were made in the Spring, presumably on overwintered material.

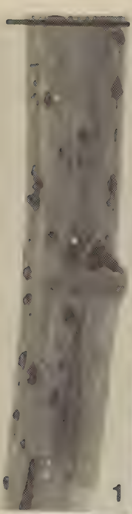
Our first collection of this fungus was taken in Ringwood Swamp, one of the Lloyd-Cornell Preserves, about 7 miles east of Ithaca, on September 13, 1995, on stems of *Epifagus virginianus*. It is not clear whether the stems were living or dead. The presence of the undescribed *Crocicreas* on some of the stems made us suspicious that the stems were indeed dead, since that genus is unknown on living host material. The erumpent nature of the *Sclerotium orobanches* sclerotia suggests strongly that the mycelium was within the living host plant prior to formation of the sclerotia. Other collections we have made were in the Autumn and in the Spring. In addition to *Sclerotium orobanches* and its synanamorph, and the apparently undescribed *Crocicreas* found in many of the same collections, a second inoperculate discomycete, *Hyalopeziza millepunctata* (Lib.) Raitv., was found on the basal scales at the soil level in some collections. Cultures of both of these fungi produce colonies quite distinct from those of *S. orobanches,* and clearly neither is the teleomorph of the sclerotial fungus.

On examining the sclerotia closely (which also occur frequently in the floral parts, not noted by either Schweinitz or Fries) (Figs. 1–3) we discovered that some sclerotia bore one or up to 8 rather large, papillate pycnidia (Figs. 4–5) filled with unicellular, hyaline conidia (Fig. 6). It is possible that pycnidia were present in Schweinitz's original material, which could account for his description (Schweinitz, 1822) of the sclerotia as "superficie tuberculatum," which Fries (1822) rendered as "rugulosum," based on the material Schweinitz had sent him. Our examination of an authentic or possibly even isotype specimen from one part of the Schweinitz herbarium did not reveal any pycnidia. Sections of our material show that pycnidia arise directly from the sclerotia, with their outer surface a clear continuation of the sclerotial rind (Figs. 7–8), leading us to believe they were one and the same fungus, and not a sclerotium and a hyperparasite. Our isolations from surface-disinfected sclerotia and from single conidia confirmed that all such isolates can produce both sclerotia and pycnidia in culture (Figs. 9–12), though the medium used and the light/dark and temperature regimes may result in cultures with only pycnidia, only sclerotia, or sclerotia and pycnidia, with pycnidia either separate from or developing on sclerotia. The size of the sclerotia varies among treatments, and in nature pycnidia have one ostiolar beak, very rarely 2 (Figs. 4–5), while in culture pycnidia regularly have 1 to 3 beaks (Figs. 10–12). Small, sterile bodies resembling pycnidia, and termed pycnosclerotia, are also sometimes present on the host tissue and may also be produced in culture (Fig. 13). Some of the more significant cultural features are presented in TABLE I, with each recorded observation based on 9 isolates (8 derived from sclerotia, one derived from a single conidium), each replicated 4 times, for a total of 36 replicates.

We conclude that this synanamorph is presumably best placed in the genus *Phoma* Sacc. It does not fit the descriptions of *Phoma orobanches* C. Massal. (Massalongo 1888, 1889) nor of *Ascochyta orobanches* Tassi (1896). Since *Phoma* is currently being monographed by colleagues in The Netherlands (G. H. Boerema, J. de Gruyter, M. E. C. Hammers, H. A. van Kesteren, W. M. Loerakker, and M. E. Noordeloos), we have sent isolates to them and will defer to their identification of the pycnidial morph. They advise us that the isolates belong in *Phoma* sect. *Plenodomus*. This may well represent the first connection of a *Phoma* with a massive sclerotial synanamorph.

We illustrate here (Figs. 1-13) the sclerotia on the host plant, sections thereof, including sections through its pycnidial synanamorph, and the sclerotia and pycnidia as they develop in artificial culture. A culture is on deposit as ATCC 201728.

Figs. 1–8. *Sclerotium orobanches* on stems and floral parts of *Epifagus virginianus*, all from CUP-63537. Fig. 1. Scattered to gregarious sclerotia on the surface of and often erumpent from stems (also visible are some tiny apothecia of an undescribed species of *Crocicreas*). (Bar = 0.5 cm.) Fig. 2. Same at higher magnification. (Bar = 1 mm.) Fig. 3. Sclerotia abundant within a floral cupule. (Bar = 1 mm.). Fig. 4. A vermiform sclerotium viewed from above, with two basally situated pycnidia. (Bar = 100 μm) Fig. 5. A sclerotium viewed from below, a portion of the host tissue adherent and out of focus, with five pycnidia arising from the sclerotium. (Bar = 100μm) Fig. 6. Pycnidial conidia. (Bar = 2.0μm) Fig. 7. Non-median section of a pycnidium (and a portion of a second pycnidium) and the relationship to the sclerotium, showing continuation of sclerotial rind and pycnidial wall. (Bar = 50 μm) Fig. 8. Pycnidial wall structure in section. (Bar = 20μm).



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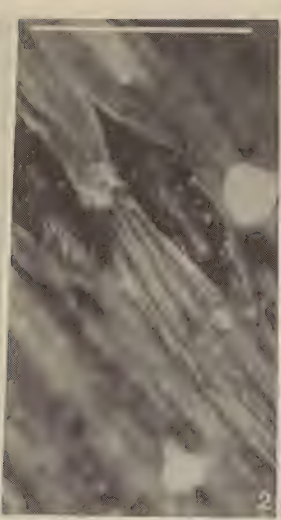

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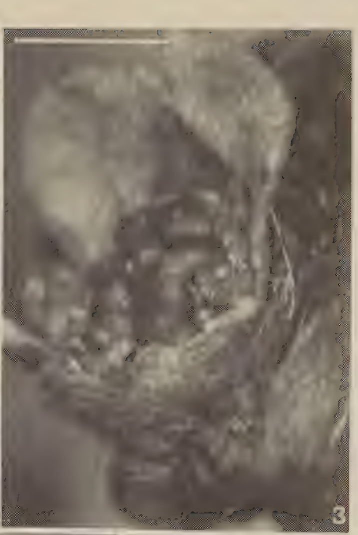

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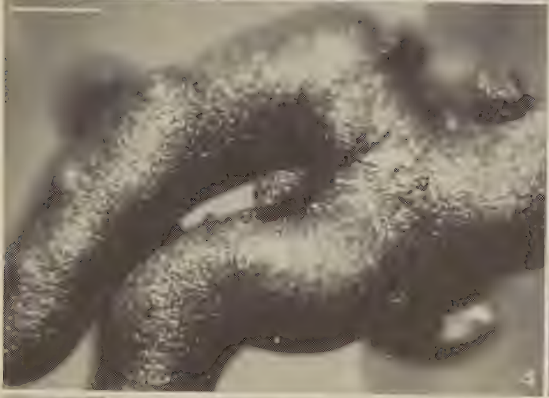

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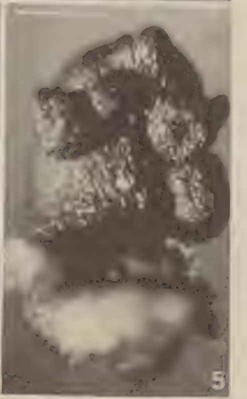

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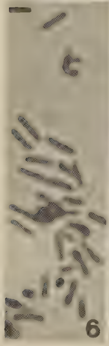

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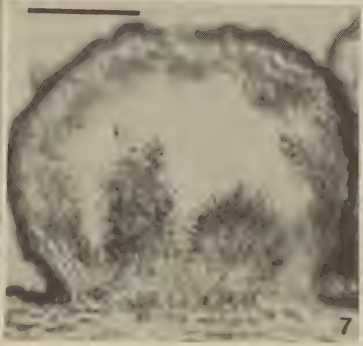

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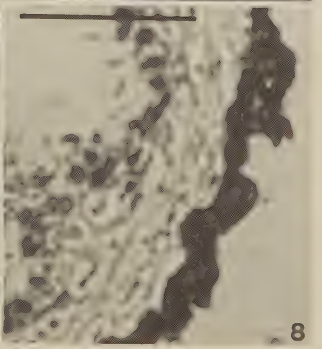

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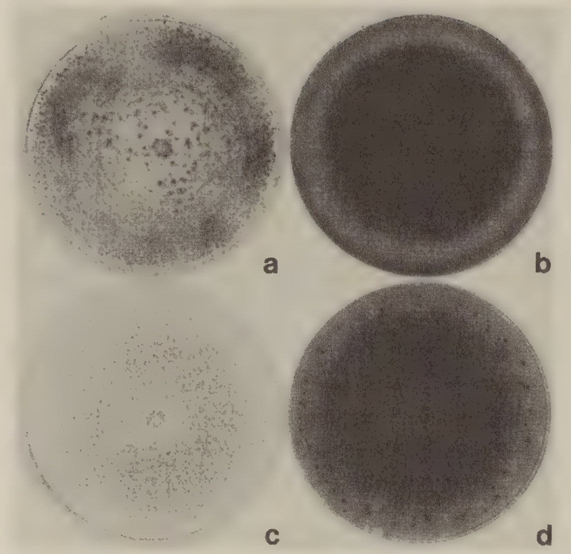
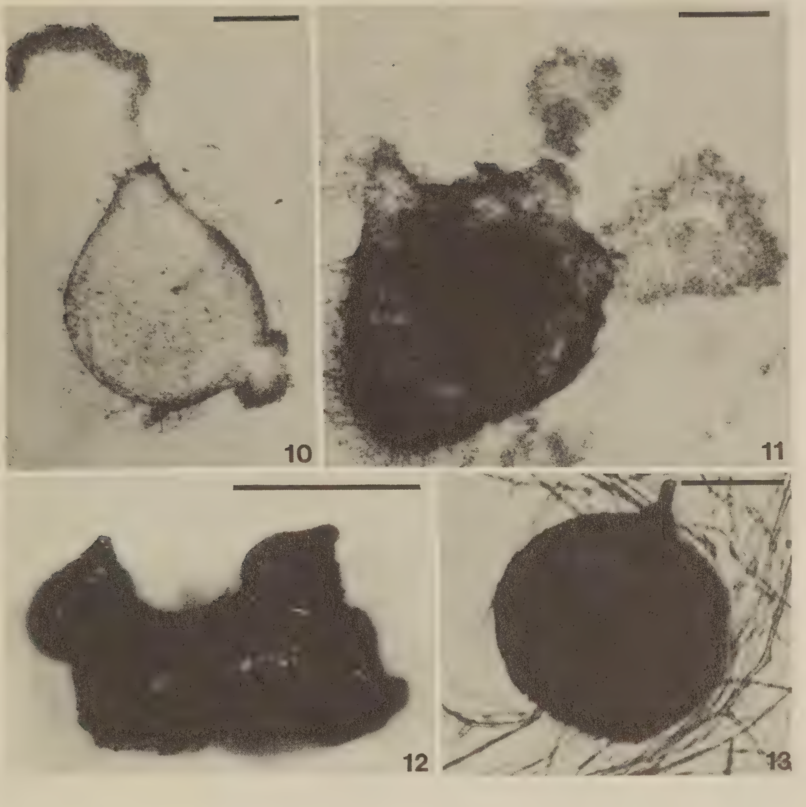


Fig. 9. Cultures of a single pycnidiospore isolate derived from CUP 63537 on MGA under four regimes: a) 12 hr light/12 hr dark at 25 C, pycnidia arising in concentric circles; b) 24 hr dark at 25 C, only mycelium developed; c) 24 hr light, at 15 C, only pycnidia produced; d) 24 hr dark, at 15 C, primarily sclerotia, some pycnidia, some pycnosclerotia.

We provide a revised description of this fungus and of its organic relationship to its pycnidial synanamorph, and a listing of the collections examined. M.Y.-M. is responsible for all culture work, microscopic data, and for arranging for most of the photographs. R.P.K. is responsible for the discovery of the pycnidial anamorph and for the literature study. J.F.B. collected most of the new records.

Sclerotium orobanches Schwein., *Syn. fung. Carol. sup.* p. 57. 1822 : Fr.

SCLEROTIAL ANAMORPH: *In vivo* sclerotia immersed in or erumpent from or superficial on dead stems, flowers, and roots of the host plant, separate or in small clusters, rounded to elongate, often lobulate or twisted to vermiform, occasionally semi-reticulate when produced in floral cups, externally black, smooth or with 1-8 distinct protrusions (the pycnidial morph), hyaline within, (0.6–) 1.0 (–1.5) x (0.2–) 0.4 (–0.9) mm (Figs. 1–5); *in section* with a dark-walled cortex of textura angularis and a hyaline medulla of textura angularis (Fig. 7). *In vitro* sclerotia superficial, variously shaped, abundant and dispersed on some media, rare to fairly common at the periphery of plates on other media, produced in 4 weeks, developing their final shape and



Figs. 10–13. *Sclerotium orobanches* and its *Phoma* synanamorph in culture, all derived from CUP 63537. Fig. 10. Pycnidium developed on water agar, showing a cirrus of pycnidiospores. (Bar = 100μm) Fig. 11. A multiostiolate pycnidium slightly squashed with pycnidiospores exiting at least three ostioles. (Bar = 100 μm) Fig. 12. Two pycnidia borne on a sclerotium in PDA medium under a regime of 24 hr dark at 15 C. (Bar = 0.5 mm) Fig. 13. Pycnosclerotium and mycelium in MGA medium under a regime of 24 hr dark at 15 C. (Bar = 100 μm).

dark pigmentation during the 5th to seventh week, on potato dextrose agar (PDA) (0.3–) 0.6 (–1.0) x (0.4–) 0.5 (–0.7) mm, on malt extract glucose agar [MGA, = "Medium A" of Buscot (1993)] (0.4–) 1.0 (-2.0) x (0.2–)0.6 (–1.0) mm, arising from an olive-green to brown mycelium (Figs. 9, 12). Very hard, small, beaked

Table 1. Cultural characters of *S. orobanche* and its pycnidial synanamorph in two media and four regimes grown in 8.5 cm plastic Petri dishes.

			Cultural regimes							
	Media		D/L-12 h-25 C		D-24 h-25 C		L-24 h-15 C		D-24 h-15 C	
Structures*	MGA	PDA	1 week	5-7 wks	1 week	5-7 wks	1 week	5-7 wks	1 week	5-7 wks
Pycnidia										
Separate	•		–	+++	NR	–/+^{1}	+++	+++	NR	+/+++
		•			NR	+^{2}	+++^{3}	+++^{3}	–	–
In clusters		•			NR	+	–	–	NR	++
On sclerotia		•			NR	–	–	–	NR	+/++^{4}
Sclerotia	•		–	–	NR	–/+	–	–	NR	+/+++
		•			NR	–	–	–	NR	++^{4}
Pycnosclerotia	•		NR	+/++	NR	–		–/++	NR	–/+++
		•				–		–		NR
Colony diam/cm	•		3.7-4.8	7.3-8.5	NR	4.9-8.5	2.5-3.2	7.3-8.5	NR	6.8-8.5
		•				NR	3.0	8.5		NR
Colony surface	•			HI		GW		HI		gB
	•									SGP
	•					gBG				
	•					CGP				
		•				CGS		CGW		CG

CG = cottony gray
CGP = cottony dark gray to light gray periphery, dark pigment in medium
CGS = cottony gray with white spots
CGW = cottony gray to white
D = grown in dark
GW = dark gray, white zones
gB = dark greenish brown
gBG = dark greenish brown to light gray
HI = hyaline immersed
L = grown in light
MGA = malt extract, glucose agar
PDA = potato dextrose agar
SGP = surface scanty gray, immersed greenish brown, dark pigment in medium

*Abundance indicated by: – = absent
+ = rare
++ = moderate
+++ = abundant
NR = not recorded

[1] restricted to one area of one plate
[2] only at periphery of colony
[3] two different kinds of pycnidia
[4] under cotton mycelium, only at periphery of colony on wall of plate

structures, (50–) 86 (–130) x (60–) 96 (–160) µm, resembling pycnidia but without spores, thus apparently pycnosclerotia, are produced on MGA under some cultural conditions (TABLE I, Fig. 13), and have rarely also been observed in some field collections.

PYCNIDIAL SYNANAMORPH: a species of *Phoma* section *Plenodomus. In vivo* pycnidia found dispersed only on the surface of sclerotia, typically at the base, black, globose to subglobose, (130–) 270 (–370) µm high, (110–) 206 (–333) µm wide, with an ostiole-bearing papilla (10–) 54 (-80) x (20–) 52 (–70) µm; *in section* with the outer wall of the pycnidium clearly merely an extension of the sclerotial rind, with no differentiated lower wall to the pycnidium (Figs. 7–8), uniloculate, filled with aseptate, ovoid, sometimes guttulate, hyaline conidia (2.0–) 3.1 (–4.0) x (0.8–) 1.0 (–1.5) µm (Fig. 6). *In vitro* dark-colored pycnidia produced on potato dextrose agar (PDA) much as described above, complex wall 4 or more cells thick, frequently with 1 to 3 beaks (Figs 10–11), produced in 3-8 days, conidia exuding in cream-beige drops from the ostiole, (180–) 268 (–370) x (90–) 185 (–270) µm, with papilla (20–) 59 (–110) x (50–) 63 (–100) µm; also pycnidia with a much thinner, membranous wall,

cream-salmon in color, produced on PDA, (360–) 464 (–650) x (280–) 368 (–550) µm, with the papilla (60–) 96 (–130) x (50–) 75 (–120) µm and similar conidia (2.0–) 3.6 (–4.5) x (1.0–) 1.5 (–2.0) µm.
TELEOMORPH: unknown.

COLLECTIONS EXAMINED: **Canada:**[1] *ONTARIO:* MIDDLESEX COUNTY, on *"Epiphigus,"* in James Grant's Woods [presumably near London, Ont.], "1834" [Dearness's "species number"], 4th May 1892, DAOM [unaccessioned material in Dearness Herbarium]; on *"Epiphyus,"* London, *s.n., s.date,* "1834," NYBG; another packet, same data, NYBG; On dead stems of *"Epiphigus,"* London, no collector, *s.n.,* May '92 (presumably 1892), NYBG; **United States:** *NEW YORK:* ALBANY COUNTY, on *Leptamnium virginianum* [= *Epifagus virginianus*], Knowersville [now Altamont], NY, C. H. Peck *s.n., s. date,* CUP 17813, NYS *s.n.*; ERIE COUNTY, no host indicated, Buffalo, NY, "Ex Coll. G. W. Clinton," *s.n., s. date,* with Columbia College Herbarium stamp, NYBG; ONONDAGA COUNTY, on *Epifagus virginianus,* Labrador Lake, NY, G. L. Hennebert 2037, 20 April 1961, DAOM 75671, MUCL 2037; TOMPKINS COUNTY, Ringwood, NY, on stems of *Epifagus virginianus,* Lloyd-Cornell Preserve, T. Iturriaga, R. P. Korf, & P. Mullin *s.n.,* 13 Sept. 1995, CUP 63537 (in association with a new species of *Crocicreas* described elsewhere); same data, J. F. Babcock & R. P. Korf *s.n.,* 24 Oct. 1995, CUP 63563; same data, J. F. Babock, *s.n.,* 10 May 1997, CUP 63660; same data, 25 May 1997, CUP 63661; on old (overwintered?) roots, stems, and floral parts of *Epifagus virginianus,* same locality, 23 Sept. 1997, J. Babcock & R. P. Korf, *s.n.,* CUP 63662; on stems of *Epifagus virginianus,* same locality, 23 Sept. 1997, J. F. Babcock *s.n.,* CUP 65328; same data, 15 Oct. 1997, J. F. Babcock *s.n.,* CUP 65332; WASHINGTON COUNTY, on dead stems of *O. virg.,* Fort Edward, NY, "Ex Coll: E. C. Howe," E. C. Howe, *s.n.,* 1867, NYS *s.n.*; WYOMING COUNTY, same substrate, Faun Lake, Wethersfield, NY, 12 Oct. 1997, J. F. Babcock *s.n.,* CUP 65330;. *PENNSYLVANIA:* NORTHAMPTON COUNTY, Salem-Beth[lehem]. On *Orobanche.* 2442–28–Syn. Fung. ex Herb. Schw., *s.n., s. date,* BPI, *authentic* or possibly *isotype* material of *Sclerotium orobanches.*

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We gratefully note the assistance of Kathie T. Hodge, a graduate student in this Department, who isolated both the undescribed

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[1] All four Canadian collections were clearly collected by John Dearness.

Crocicreas mentioned above and *Hyalopeziza millepunctata,* allowing us to compare these fungi in culture to our isolates of *Sclerotium orobanches.* Kent Loeffler of our Department was responsible for printing much of the photography reproduced here; M.Y.–M. thanks David LoParco and Stan Kawamoto of our Department for their help in photographing specimens and slides. We thank Robert Dirig at BH, Amy Y. Rossman at BPI, Scott A. Redhead at DAOM, and Roy E. Halling at NY for their generous loans of critical specimens, and Roland Moberg at UPS for information on the collections in that herbarium. We thank John Haines of the New York State Museum for providing the lead to Peck's report of *Sclerotium orobanches,* for helping locate an obscure village name, and for agreeing to be a pre-submission reviewer of this paper.

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MYCOTAXON

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THE LICHEN GENUS *STIRTONIA* (FAMILY ARTHONIACEAE)

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ABSTRACT

A morphotaxonomic account of all known species of *Stirtonia* is presented. Of the 18 species described for the genus, 12 are accepted and a key for their determination is provided. *Stirtonia indica* Makhija & Patw. is newly described, and names of 5 species reported by Groenhart, but hitherto remaining as *nomina nuda*, are validated: *S. aggregata* Groenh., *S. alba* Groenh., *S. gibberulosa* Groenh., *S. marginta* Groenh. and *S. mellea* Groenh. Six species are excluded from the genus: *S. amazonica* Sambo, *S. arthonioides* Groenh. *nom. nud., S. macrocephala* R. Sant., *S. monospora* Awasthi & K. P. Singh, *S. sprucei* R. Sant., and *S. verruculosa* Groenh. *nom. nud.*

INTRODUCTION

As early as 1876 James Stirton had described the primitive lichen genus *Cryptothecia* with *C. subnidulans* Stirt. as the only known species, and two years later he (1879) published three more species of this genus: *C. obvallata* Stirt., *C. involuta* Stirt. and *C. subtecta* Stirt.

Forty-seven years later, while studying British lichens, A.L. Smith examined Stirton's large collection of lichens in the herbarium in Glasgow. Consequently, the genus *Cryptothecia* as understood by Stirton was revised and split up by Smith (1926) into two genera *Cryptothecia* (muriform ascospores) and *Stirtonia* A.L. Sm. (transversely septate ascospores).

The genus *Stirtonia* was based on two species, *S. obvallata* (Stirt.) A.L. Sm. and *S. dubia* A.L. Sm. It seems that the latter work of Stirton (1879) was not known to Smith when she made her revision and stated *Cryptothecia obvallata* Stirt. as unpublished.

Since *Stirtonia obvallata* (Stirt.) A. L. Sm.(= *Cryptothecia obvallata* Stirt.) was published earlier by Stirton (1879) it has been designated as the type species of this genus in the present treatment of *Stirtonia*.

Smith (1926), who found close similarity in the basic structure of the thallus, the fertile parts (ascigerous parts) and the asci between the two genera, assigned *Cryptothecia* and *Stirtonia* to a separate family, the *Cryptotheciaceae.* She regarded the family closely related to Thelocarpaceae and Mycoporaceae among the pyrenolichens, and Myrangiales were the nearest fungal allies.

Santesson (1952) did not find the limits between the Cryptotheciaceae and Arthoniaceae to be distinct and considered the recognition of the Cryptotheciaceae as a separate family unjustified. Later authors have accepted this (e.g. Luttrell, 1973; Poelt, 1974; Henssen & Jahns, 1974; Von Arx & Müller, 1975, Eriksson, 1981, and Makhija & Patwardhan, 1985, 1987, 1994).

Eriksson's (1981) studies on the ascus morphology of numerous lichenized and non-lichenized representatives of this group of fungi confirmed Santesson's observations, and this is also accepted here.

Thus, in modern lichenological literature *Stirtonia* has been placed in the family Arthoniaceae along with *Arthothelium* Massal., *Arthonia* Ach., and *Cryptothecia* Stirt. Within the family, *Stirtonia* is most closely related to *Cryptothecia* in having distinctly non-coherent interthecial tissue, lacking ascomata, but with their asci immersed in soft thalline tissue. *Arthonia* (ascospores transversely septate) and *Arthothelium* (ascospores muriform) have apothecioid ascomata and have coherent interthecial tissue (paraphysoids).

Initially it would appear that ascospore septation is the only character separating the two genera *Cryptothecia* and *Stirtonia*. However, our study of the type collections of almost all previously known species of these genera, including authentic speciemens of the species proposed by Groenhart (1938a,b) and much of the non-type material, has revealed no intergeneric-links, that is, species that have very similar morphology and chemistry, but differ only in ascospore type. All species of *Cryptothecia* have ascospores invariably muriform and without enlarged end cell(s). None of the species of *Stirtonia* has been found to have ascospores with occasional vertical septa.

Besides, the transversly septate ascospores, species of *Stirtonia* differ considerably from *Cryptothecia* in their chemical contents also. Barbatic, confluentic, gyrophoric, 2′-*O*-methylperlatolic, norstictic, and psoromic acids and unknown lichen substances have been reported in *Cryptothecia* (Makhija & Patwardhan, 1985, 1987, 1994). However, *Stirtonia* has insignin, psoromic, 2′-*O*-methylsuperphyllinic, 2′-*O*-methylnorsuperphyllinic and 4′-*O*-demethylsuperconfluentic acids and unknown lichen substances.

Further, a careful examination of the types of a large number of *Arthothelium* species has revealed that several species belong to *Cryptothecia* and they were subsequently transferred to that genus (Makhija & Patwardhan, 1985). It can be anticipated that a revision of the genus *Arthonia* will certainly reveal several of them belong to *Stirtonia,* and perhaps also reveal some intergeneric links. Until then we do not wish to suggest any reorganization, and we prefer to keep *Stirtonia* as a separate genuus.

Groenhart (1938a,b), published an interesting paper with surprising data on Cryptotheciaceae and proposed several new names, including seven species names of *Stirtonia* from Java. Unfortunately these names were *nomina nuda* (vide Lamb, 1969) and no validating descriptions of them have hitherto been published. However,we have been able to examine the relevant authentic material, and five of these names are validated in this paper.

In 1940, Cengia Sambo described *Stirtonia amazonica* from Brazil with a very short inadequate description without the ascospore size. It is probably an *Arthonia* (Santesson, 1945).

In his monumental work on foliicolous lichens, Santesson (1952) described two foliicolous species of the genus, namely *Stirtonia macrocephala* R. Sant, from the Philippines, Sumatra, Borneo, New Guinea, and *S. sprucei* R. Sant. from Brazil.

The corticolous species *Stirtonia monospora* Awasthi & K. P. Singh from India was established by Awasthi and Singh (1971). More recently, Makhija and Patwardhan (1987) added four new finds of this genus from the Andaman & Nicobar Islands of India, namely *S. alboverruca* Makhija & Patw., *S. macrocarpa* Makhija & Patw., *S. ramosa* Makhija & Patw. and *S. santessonii* Makhija & Patw. However, a revision of the types of the allied genus *Arthonia* will certainly reveal several of them belong to *Stirtonia*.

Stirtonia, a rare and a much neglected genus, may be much better represented in tropical regions than present records would suggest. Of the 18 species described for this genus, 12 are accepted here.

MATERIALS AND METHODS

Specimens have been studied from the herbaria **AMH, BM, L, LWG, LWU,** and **UPS**. All specimens were examined with a stereomicroscope and light microscope. Sections of the thallus and the ascigerous parts were stained with Lugol's solution. All sections were examined with lactophenol as mounting medium. Chemical data were obtained by standardized TLC method (Culberson, 1972; Culberson & Kristinsson,1970) by using solvent systems benzene-dioxane-acetic acid (180:45:5, 230 ml) and hexane-diethylether-formic acid (130:80:20, 230 ml). The thalli were observed under UV light.

MORPHOLOGICAL CHARACTERS

Thallus: The thallus structure in *Stirtonia* is crustose, ecorticate and basically simple, white to greenish, endophloeodal, superficial or entangled with the outer cells of the bark, and in all species I+blue . Algae belong to the genus *Trentepohlia*, often forming a continuous and distinct, fairly thick layer. The medulla is a distinct zone located below the algal layer, and formed of colourless, loosely wefted hyphae often studded with numerous colourless crystals of calcium oxalate.

The basically simple thallus structure in *Stirtonia* varies little in such characters as texture, colour, and is of doubtful value in the delimitation and identification of the species.

Ascomata: Smith (1926) used the term perithecium for the fruit body, which was completely occupied by the single ascus, while the brownish tissue lining the perithecium in *Cryptothecia* and *Stirtonia* was referred to as the peridium. However, like *Cryptothecia, Stirtonia* does not produce true, well-defined ascomata. Santesson (1952) had already reached the same conclusion, referring the *Cryptothecia* and *Stirtonia* along with genera of Arthoniaceae and Opegraphaceae, to a group of lichens with ascolocular (ascostromatic) fruit bodies.

Groenhart (1965) opined that these structures, consisting of ascogenous cells, asci and enveloping hyphal tissue, represent some kind of ascoma. Groenhart (1965) seems to be perfectly correct in emphasizing that "no other means of deferring the group to which the ascocarp is to be referred except to study its mode of development". Consequently, he extended the revision of Cryptotheciaceae with a comparative study of the development and structure of other ascomata, especially of those in lichen-fungi. Unfortunately the results of his studies have remained unpublished.

In *Stirtonia* typical ascomata are lacking but asci are restricted to small, pure white cushions of soft mycelium and are immersed in undifferentiated, loose, thalline tissue over most of the thallus. As in *Cryptothecia,* the interthecial tissue is very loose and not even slightly coherent when wet and is one of the most deciding characters distinguishing *Stirtonia* from *Arthothelium* and *Arthonia*.

In the present paper the fertile parts of the thallus are referred to as 'ascigerous parts'. The nature of the fertile parts of the thallus is one of the most significant and reliable characters for species delimitation in *Stirtonia*. In all species, the ascigerous parts of the thallus are white, whitish or greyish, and at least in *S. ramosa* they closely resemble ascomata.

Interestingly enough, species of *Stirtonia* exhibit a progressive complexity from solitary isolated asci to the aggregation of them in a special delimited thalline tissue. In the most extreme species the asci are very regularly spread out in ± the whole thallus and no distinct differentiation of the thallus into fertile and sterile parts can be found, e.g. in *Stirtonia obvallata*. In *S. mellea* and *S. gibberulosa* they are externally invisible, but if seen under higher magnification they appear as minute, pale-brown spots indicating the presence of asci. In *S. marginata* the asci form small clusters each containing a few asci and appearing on the surface of the thallus as slightly elevated spots, each with a surface not unlike a developing soredium. In *S. dubia* the fertile parts are externally invisible, even though the asci are closely associated in these fertile parts.

In *Stirtonia indica* and *S. alboverruca* only certain parts of the thallus contain the asci and the asci are evenly spread out in well-differentiated fertile parts that are somewhat prominent and pure white in colour. In *S. macrocarpa* and *S. aggregata* they are concolorous with the thallus but rounded, and foveolate, while in *S. santessonii* they are elongate and more or less linear.

The fertile areas may be markedly differentiated from the sterile parts, e.g. in *Stirtonia ramosa* where they are lirelline and branched.

Ascus: The asci in *Stirtonia* are 8-spored, almost globose, thick-walled, stalked and invariably bitunicate, i.e. with an outer thin ectotunica (exoascus) and an inner thick endotunica (endoascus) and often with a dome shaped extension of the endotunica at the top, K/I+ light blue and with no apical zonation or ring formation. The asci in *Stirtonia* appear to be most similar to *Cryptothecia.* Microscopic observations of ascus dehiscence and ascospore release are extremely rare, and empty asci with ascospores released have been observed only rarely. According to Eriksson (1981), who studied the morphology of the asci in the lichenized and non-lichenized members of this group of fungi, the dehiscence is probably fissitunicate or semifissitunicate in normal cases.

Ascospores: The ascospores in *Stirtonia* are consistently colourless, transversely septate, ovoid, oblong, ellipsoid or clavate, and thin-walled. The number of cells, the shape and the size of the ascospores have all been found useful characters for identifying and delimiting species.

Two main types of ascospores occur in *Stirtonia*. In the first type they are transversely divided into equal cells. Examples of this type are *S. alboverruca, S. aggregata* , *S. dubia, S.mellea,* and *S. obvallata* In the second type ascospores are divided unequally by the transverse septa, resulting in the terminal cell(s) at one end or occasionally at both ends being much larger and other cells narrower and equal. Rarely, one or two cells are larger in the median part of the ascospores .

Ascospore with a large terminal cell and generally a clavate shape are found in *Stirtonia alba and S. santessonii*, whereas an enlarged terminal cell often at both ends is charicteristic of *S. ramosa*. Species having one or two enlarged cells in the median part of the ascospores are *Stirtonia macrocarpa* and *S. marginata*.

Ascospore size varies from species to species. The smallest ascospores are found in *Stirtonia dubia, c.* 17–30 x 6–7 µm, whereas the largest are found in *Stirtonia macrocarpa,* reaching *c.* 88–116 x 29–36 µm.

LICHEN SUBSTANCES

In *Stirtonia* as in many other groups of lichens, chemistry provides important characters for species delimitation .

Makhija and Patwardhan (1987) reported the occurrence of 2′-*O*-methylsuperphyllinic acid, insignin and traces of triterpenes in *Stirtonia alboverruca*. They (1987) also reported the presence of three unidentified compounds in *S. macrocarpa* , unidentified depsides in *S. ramosa* and three unidentified yellow pigments in *S. santessonii.*

Subsequently, the two new paradepsides in *Stirtonia ramosa* were studied and identified as 4′-*O*-demethylsuperconfluentic and 2′-*O*-methylnorsuperphyllinic acids (Culberson *et al.,* 1990). Other secondary products were also reported in *S. ramosa* - a trace compound (Srm.-3) and aliphatic compounds (Srm.1 and Srm.2) for which no TLC spots were detected.

The identified lichen substances occurring in *Stirtonia* are insignin, psoromic, 2′-*O*-methylsuperphyllinic, 2′-*O*-methylnorsuperphyllinic and 4′-*O*-demethylsuperconfluentic acids. Nevertheless, several detected lichen substances are still unidentified.

In the newly described *Stirtonia indica* the occurrence of an unknown substance is indicated by a greenish-blue spot just below psoromic acid on TLC plates in both BDA & HEF. Another unidentified substance is found in *S. alba,* indicated by a yellow spot surrounded by a bluish-grey ring above confluentic acid in BDA & HEF. In *S. mellea* an unknown pink spot above and below the norstictic acid respectively in BDA & HEF has been found.

ECOLOGY AND DISTRIBUTION

Stirtonia, is a genus of tropical lichens, apparently confined to Asia. However, the present knowledge of the distribution of *Stirtonia* is very fragmentary and is based mainly on incidental collections. It is uncertain if the presently known species are really restricted only to the areas from where they are known at present. All species of *Stirtonia* are corticolous and found on the barks of trees in the primary forest in these areas where they are equally and sufficiantly exposed to rain, sunlight and wind.

As evident from our studies, out of the twelve species of *Stirtonia,* so far known at world level, as many as nine species, namely *S. aggregata, S. alba, S. alboverruca, S. gibberulosa, S. macrocarpa, S. marginata, S. mellea,* *S. ramosa*, and *S. santessonii,* have been found to occur in the coastal regions of Java and the Andaman islands. The species *S. dubia* and *S. obvallata* are known only from their types and they were collected from Chinsurah which is located in the drier parts of Indo-Gangetic Plain in West Bengal, India. The new species, *S. indica* from Chittery (Chittery hills of Tamil Nadu, India), is known from a single collection, with associated lichens mainly belonging to Graphidaceae and Thelotremataceae. Thus, *Stirtonia* is well represented in India by seven species.

Genus *Stirtonia* A.L. Sm.

Trans. Brit. Mycol. Soc. **11**: 195, 1926. [**Lectotype** (designated here) : *Stirtonia obvallata* (Stirt.) A.L. Sm. (= *Cryptothecia obvallata* Stirt. *Proc. Phil. Soc. Glasgow* **10**: 319, 1879)].

Thallus crustose, white, greenish-white, ± effuse, ecorticate, UV-ve, I+ blue; lacking well defined ascomata; algae *Trentepohlia*. Ascigerous parts (fertile parts) extensive, with their asci immersed in soft thalline tissue, more or less regularly spread into the whole thallus, or with asci forming small clusters on the surface of the thallus (not unlike a soredium), or they are well differentiated from the sterile parts forming cushion-like structures. Interthecial tissue I+ blue. Asci ± globose, bitunicate, thick walled, often with a dome shaped extension of the endoascus, K/I+ light blue, but no zonation or ring structure visible in K/I, with fissitunicate or semifissitunicate dehiscence. Ascospores 8 per ascus, hyaline, transversely septate, smooth walled and without a distinct perispore. Conidiomata not found.

KEY TO THE SPECIES OF *STIRTONIA*

1a. Ascigerous parts (fertile areas) well differentiated, delimited **2**

1b. Ascigerous parts not well differentiated, extensive **7**

2a. Ascigerous parts foveolate **3**

2b. Ascigerous parts not foveolate **4**

3a. Thallus greyish-white, ± glossy, totally endophloeodal ; ascigerous parts white, more or less rounded to irregular, foveolate, aggregated in groups; ascospores 9–12-septate, with subequal cells, 66–96 x 30–35 µm; no lichen substances present .... ***S. aggregata***

3b. Thallus greyish-white, totally endophloeodal; ascigerous parts rounded to orbicular, concolorous, 0.5–1.5 mm in diameter; ascospores 12–16 septate, often with middle cells slightly larger, 88–116 x 29–36 µm; three unidentified substances present .... ***S. macrocarpa***

4a. Ascigerous parts lirelline.
Thallus greenish-grey, smooth to verruculose; ascigerous parts distinct, white, lirelline, branched; ascospores 5–6-septate, one or both terminal cells larger, 43–63 x 17–23 µm; 4′-*O*-demethylsuperconfluentic, 2′-*O*-methylnorsuperphyllinic acids and three unidentified substances present .... ***S. ramosa***

4b. Ascigerous parts irregular **5**

5a. Ascospores exceeding 100 µm in length.
Thallus greyish-white, epiphloeodal; ascigerous parts distinct white, round to elongate, elevated, orbicular 0.8 mm in diameter; ascospores 11– 15 septate, 88–108 x 40–43 µm; 2′-*O*-Methylsuperphyllinic acid present. . ... ***S. alboverruca***

5b. Ascospores not exceeding 100 µm in length **6**

6a. Thallus yellowish-grey, endophloeodal; ascigerous parts white, elevated rounded to linear or irregular, 0.5–1.2 mm across; ascospores 7-septate, with one terminal cell larger, 33–50 x 13–17 µm; three pigments present .... ***S. santessonii***

6b. Thallus chalk-white, powdery, highly studded with crystals, epiphloeodal; ascigerous parts white, elevated verrucae, 1–5 mm long and 1–3 mm broad; ascospores 6–9-septate, 53–59 x 13–23 µm; psoromic acid and an unidentified substance present .... ***S. indica***

7a. Ascigerous parts foveolate **8**

7b. Ascigerous parts not foveolate... **9**

8a. Thallus verrucose; ascigerous parts extensive, large; ascospores 7–9 septate, 33–50 x 13–18(26) µm; no lichen substances present .... ***S. gibberulosa***

8b. Thallus smooth; ascigerous parts white, large, extensive, 0.25–5 mm long and 2.5–3.5 mm broad; ascospores 9–13-septate, 59–80 x 27–35 µm; unidentified lichen substance present .... ***S. mellea***

9a. Ascospores with equal cells **10**

9b. Ascospores with unequal cells **11**

10a. Thallus partly epihloeodal; ascigerous parts extensive, externally invisible; asci densely scattered in ascigerous parts; ascospores

6–7-septate; 17–30 x 6–7 µm; no lichen substances present .... ***S. dubia***

10b. Thallus smooth; ascigerous parts externally invisible; ascospores 7–9 septate, with subequal cells, 45–89 x 20–33 µm; no lichen substance presents .... ***S. obvallata***

11a. Thallus smooth; ascigerous parts invisible having groups of asci embedded in bark; ascospores 8-septate, 46–66 x 14–20 µm with unequal cells and often with central cells larger; no lichen substances present .... *S.* ***marginata***

11b. Thallus smooth; ascigerous parts invisible; ascospores 5-septate, with terminal cell larger at one end, 33–60 x 18–22 µm; unidentified lichen substance present .... ***S. alba***

TAXONOMIC DESCRIPTIONS

Stirtonia aggregata **Groenh. ex Makhija & Patw.** ***sp. nov.***

[Figs.: 3, 15]

= *Stirtonia aggregata* Groenh. *nomen nudum.*

Natuurk. Tijdschr. Nederlandsch-Indië **98**: 307, 1938 and *Handel. Achtste Nederlandsch-Indisch. Natuurwetensch, Congr. Soerabaja* p. 415, 1938.

Type: East Java, S. Coast, near Kampeng Nglijep, S. Malang, On tree, alt. 0-10 m. P. GROENHART, No. 1452-Holotype-**L** (!)

Thallus corticola, crustaceus, griseo-albus, nitidus, tenuissimus, endophloeodes, hypothallo nigricante limitatus; stratum algiferum continuum, toto endophloeodes; pars ascigera alba, sub-rotundata, vel irregularia, foveolata, leviter elevata, *c.* 130–230 µm alta, asci bitunicati, crassitunicati, subglobosi, dispersi in texturam laxum distributi, *c.* 60–76 x 58–66 µm; ascosporae 9–12-septatae, ellipsoideae, leviter curvulae, *c.* 66–96 x 30–35 µm.

Thallus corticolous, crustose, greyish-white, slightly shining, thin, scanty, smooth, delimited by a black hypothalloidal region at the periphery, totally endophloeodal; algal layer continuous, inside the bark; ascigerous parts of the thallus white, more or less round to irregular, foveolate, aggregated in groups all over the thallus, slightly raised, *c.* 130–230 µm thick, studded with crystals. Asci subglobose, *c.* 60–76 x 58–66 µm. Ascospores elliosoid, slightly curved, 9–12-septate, *c.* 66–96 x 30–35 µm.

Chemistry: Thallus K-, C-, KC-, P-; no lichen substances present.

Specimens Examined: East Java, Bay of Nglijep, South of Donomuljo, alt. 0–10 m, on tree, 21 Aug. 1922, P. GROENHART No.529-**L**; S. Coast, near Kampong, Nglijep, S. Malang, On tree, alt. 0–10 m., P. GROENHART, No. 4691-**L**.

Remarks: *Stirtonia aggregata* is a very distinct species and can easily be recognized by its greyish-white thallus without lichen substances, having white, rounded to irregular, foveolate ascigerous parts of the thallus, aggregated in groups, and transversely 9–12-septate, ellipsoid, slightly curved, large ascospores.

Stirtonia aggregata resembles *S. alboverruca* in the appearance of the ascigerous parts of the thallus, but the latter has 2′-*O*-methylsuperphyllinic acid, isignin (trace) and triterpenes in its thallus, as well as larger ascospores with more septa.

Stirtonia alba Groenh. ex Makhija & Patw. *sp. nov.* [Figs.:4, 16]

= *Stirtonia alba* Groenh. *nomen nudum* .

Natuurk. Tijdschr. Nederlandsch-Indië **98**: 307,1938 and *Handel. Achtste Nederlandsch-Indisch. Natuurwetensch, congr. Soerabaja* p. 415, 1938.

Type: East Java, Bay of Serang, S. of Blitar On tree, Alt. 0–10 m. P. GROENHART No. 691-Holotype-**L**(!) [Annotated as *Stirtonia litoralis* Groenhart by Groenhart, Jan. 1959]

Thallus corticola, crustaceus, pallide albus, tenuissimus, effusus, rimulosus, crystallis minutis numerosis inclusus, endophloeodes; pars ascigera externe non-visa, thallo concolora, *c.* 100–200 μm alta, asci bitunicati crassitunicati, subglobosi vel globosi, distersi in texturam laxam distributi, *c.* 50–100 x 50–85 μm; ascosporae, oblongae, 5-septatae, cellulis apicarum ceteris majoribus, *c.* 33-60 x 19-22 μm.

Thallus corticolous, crustose, pale white, thin, effuse, smooth to cracked, totally endophloeodal, studded with numerous colourless crystals; algal cells in clumps; ascigerous parts of the thallus externally not visible, concolorous with the thallus, extensive; *c.* 100–200 μm thick, studded with crystals. Asci subglobose to globose, with a dome shaped extention of the endoascus, *c.* 50–100 x 50–85 μm. Ascospores oblong, 5-septate, with enlarged terminal cell

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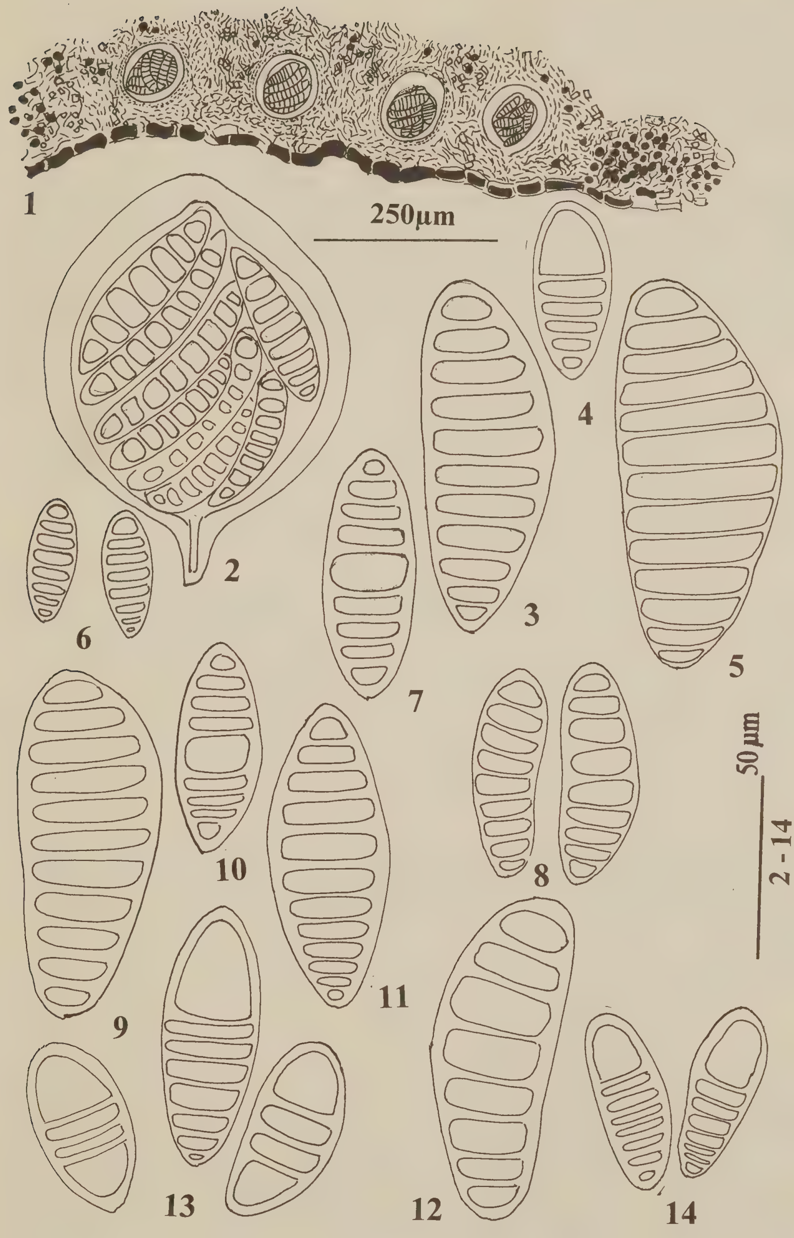
Figs.: 1-14. **1**. Vertical section of ascigerous part - *Stirtonia obvallata*, s.n.- **BM**; **2**. Ascus-*Stirtonia obvallata*, s.n.-**BM**; **3-13**. Ascospores- **3**. *Stirtonia aggregata*, 1452-**L**; **4**. *Stirtonia alba*, 691-**L**; **5**. *Stirtonia alboverruca* 85.46-**AMH**; **6.** *Stirtonia dubia*, s.n.-**BM**; **7** *Stirtonia gibberulosa*, 1455-**L**; **8**. *Stirtonia indica*, 83.47-**AMH;** **9**. *Stirtonia macrocarpa*, 86.276-**AMH**; **10.** *Stirtonia marginata*, 578-**L**; **11.** *Stirtonia mellea*, 1453-**L**; **12.** *Stirtonia obvallata*, s.n. **BM**; **13**. *Stirtonia ramosa*, 85.1122-**AMH**; **14**. *Stirtonia santessonii*, 85.1985-**AMH**.


250µm
50 µm
2 - 14

at one end, *c.* 33–60 x 19–22 µm.

Chemistry: Thallus K-, C-, KC-, P-; unidentified lichen substance indicated by yellow surrounded by bluish-grey spot on TLC plate in BDA and HEF above confluentic acid.

Remarks: Although, this species seems to have been renamed as '*Stirtonia litoralis*` by Groenhart (according to the annotation on the type specimen by Groenhart dated Jan 1959) we have adopted the species name *S. alba,* which was that provisionally used by Groenhart (1938 a,b). *Stirtonia alba* and *S. santessonii* are the only species having ascospores with an enlarged terminal cell at one end. However, *S. santessonii* has delimited, well-differentiated, white, elevated, linear to irregular ascigerous parts of the thallus and invariably 7-septate ascospores.

Stirtonia alboverruca Makhija & Patw. [Figs.: 5, 17]

Biovigyanam **13**(2): 48, 1987. Pl.1, fig. 5, Text fig. 11.

Type: India, South Andaman, Chidya Tapu, 15.2.1985, P.G. PATWARDHAN & M.B. NAGARKAR, 85.46-Holotype-**AMH(!)** , Isotype-**DUKE(!)**.

Thallus corticolous, crustose, greyish white, thin, smooth, determinated by black hypothalloidal region at the periphery, *c.* 23–36 µm thick, crystals studded; ascigerous parts of the thallus visible as distinctly white, elevated, rounded, orbicular verrucae, *c.* 128–158 µm high. Asci subglobose to globose, *c.* 42–115 x 40–88 µm. Ascospores ellipsoid, 11–15-septate, straight or slightly curved, *c.* 88–108 x 40–43 µm.

Chemistry: Thallus K-, C-, KC-, P-; 2′-*O*-methylsuperphyllinic acid, insignin (trace; +/-) and traces of triterpenes (det. C.F. Culberson).

Remarks: *Stirtonia alboverruca*, is distinguished from the allied species *Stirtonia obvallata* by its distinct, white, elevated, rounded to orbicular, crystal-studded ascigerous parts, 11–15-septate ascospores and by its chemical content.

Stirtonia dubia A.L. Sm. [Figs.: 6, 18]

Trans. Brit. Mycol. Soc. **11**: 195, 1926.

Type: India, Bengal, near Chinsurah, G. WATT, Ex Herb. Stirton, s.n.-Lectotype-**GLAM**, Isolectotype-**BM** (!)

Thallus corticolous, crustose, greyish-white, furfuraceous, for the most part endophloeodal, delimited by black hypothalloidal region at the periphery, *c.* 30–50 µm thick; algal cells scattered in the epiphloeodal part of the thallus; ascigerous parts of the thallus externally invisible, *c.* 50–90 µm thick. Asci ovoid-cylindrical to subglobose, closely arranged in groups, densely scattered in the ascigerous parts of the thallus, *c.* 40–53 x 20–33 µm. Ascospores oblong, 6–7-septate, with equal cells, *c.* 17–30 x 6-7 µm.

Chemistry: Thallus K-, C-, KC-, P-; no lichen substances present.

Remarks: *Stirtonia dubia* is very well distinguished from all other species of *Stirtonia* by its ovoid-cylindrical to subglobose asci and their arrangement in the ascigerous parts of the thallus. The asci here are arranged closely in groups and at first glance appear more or less like the apothecoid ascomata of an *Arthonia*. However, if examined critically their structure becomes clear as the interthecial tissue is non-coherent. *Stirtonia dubia* is distinguished from all other known species of the genus by its small ascospores.

Stirtonia gibberulosa Groenh. ex Makhija &Patw. *sp. nov.*

[Figs.: 7, 19]

= *Stirtonia gibberulosa* Groenh. *nomen nudum.*

Natuurk. Tijdschr. Nederlandsch. Indië **98**: 307, 1938 and *Handel. Achtiste Nederlandsch-Indiasch. Natuurwetensch. Congr. Soerabaja* p. 45, 1938.

Type: East Java, Bay of Nglijep, South of Donomuljo, on tree, Alt. 0-10 m, 4.10.1936, P. GROENHART , No.1455-Holotype-**L** (!).

Thallus corticola, crustaceus, pallido-albus, tenuissimus, laevis vel verrucosus, endophloeodes; pars ascigera alba, ferrinulosa, foveolata, brunneopunctata, *c.* 90–150 µm alta; asci bitunicati, crassitunicati, subglobosi, dispersi in texturam laxam distributi, *c.* 50–77 x 50–66 µm; ascosporae ellipsoideo-ovatae, 7–9-septatae, *c.* 33–50 x 13–18 (-26) µm.

Thallus corticolous, crustose, pale white, thin, effuse, smooth to verrucose, endophloeodal; algal layer running below the bark cells; ascigerous parts of the thallus extensive, visible under higher magnification as white, powdery, foveolate area all over the thallus with pores pale-brown in colour, highly studded with crystals, *c.* 90–150 µm thick. Asci subglobose, more or less uniformly scattered in the ascigerous parts, *c.* 50–77 x 50–66 µm. Ascospores ellipsoid-ovoid, 7–9-septate, *c.* 33–50 x 13–18(-26) µm.

Chemistry: Thallus K-, C-, KC-, P-; no lichen substances present.

Specimens Examined: East Java, Bay of Nglijep, South of Donomuljo, on tree, alt. 0–10 m, 21 August 1932, P. GROENHART, No.-557-**L**; East Java, Bay of Seranj, South of Blitter, on tree, 28 August 1938, P. GROENHART No.4729-**L**.

Remarks: *Stirtonia gibberulosa*, is readily distinguished from other species of the genus by its fertile parts of the thallus, which are extensive and visible only under higher magnifications as white effuse, foveolate areas all over the thallus, and by its 7–9-septate ascospores measuring *c.* 33–50 x 13–26 µm.

Stirtonia indica **Makhija & Patw.** ***sp. nov.*** [Figs: 8, 20]

Type: India, South India, Eastern Ghats, Tamil Nadu Chittery, 21.1.1983, P.K. SETHY, 83.47-Holotype-**AMH**.

Thallus crustaceus, griseo-albus, effusus, ramosus, epiphloeodes, compositus plus minusve laxe intertextus, *c.* 200–350 µm crassus; stratum algiferum *c.* 75–225 µm crassum; pars ascigera distincta, delimitata, alboverruca, *c.* 1–5 mm longa et *c.* 1–3 mm lata, 300–450 µm alta, crystallina; asci bitunicati, subglobosi vel globosi, crassitunicatii, immersi, dispersi in textura laxa distributii; ascosporae oblongae vel ellipsoideae, rectae vel curvulae, 6–9-septatae, *c.* 53–59 x 13–23 µm.

Thallus corticolous, crustose, greyish-white, cracked, effuse, *c.* 200–350 µm thick; algal layer just below the hyaline layer of fungal mycelium, continuous, *c.* 75–225 µm thick; ascigerous parts of the thallus large, white, distinct, verruceae, *c.* 1–5 mm long, and *c.* 1–3 mm broad, *c.* 300–450 µm in height studded with numerous, colourless crystals so that mycelium cannot be easily seen. Asci subglobose to globose, scattered in the ascigerous parts of the thallus, *c.* 50–83 x 43–50 µm. Ascospores oblong to ellipsoid, slightly curved, hyaline, 6–9-septate with equal, more or less rectangular cells, *c.* 53–59 x 13–23 µm.

Chemistry: Thallus K-, C-, KC-, P-; psoromic acid and an unidentified substance present (indicated by a greenish-blue spot just below psoromic acid in both BDA & HEF on TLC plate).

Remarks: *Stirtonia indica* can easily be differentiated especially by its large (1–5 mm long and 1–3 mm broad), white ascigerous parts of the thallus with numerous hyaline calcium-oxalate crystals and the presence of psoromic acid and an unidentified lichen substance in its thallus.

Stirtonia macrocarpa **Makhija & Patw.** [Figs.: 9, 21]

Biovigyanam, **13**(2): 48, 1987.

Type: India, North Andaman, Diglipur Range, Milangram, 3.1.1986, P.G. PATWARDHAN & P.K. SETHY, 86.276-Holotype-**AMH**(!), Isotype-**DUKE**(!).

Thallus corticolous, crustose, greyish-white, more or less smooth, totally endophloeodal; algal layer *c.* 33–50 µm thick; ascigerous parts of the thallus

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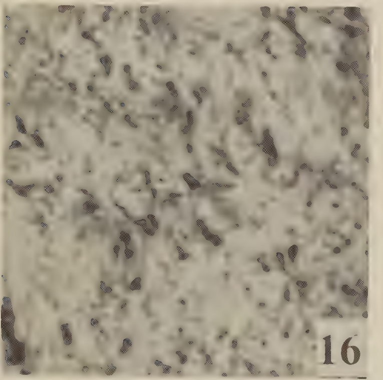
Figs.: 15-20. 15. *Stirtonia aggregata*, 1452-**L**; **16**. *Stirtonia alba,* 691-**L**; **17.** *Stirtonia alboverruca*, 85.46-**AMH**; **18**. *Stirtonia dubia,* s.n.-**BM**; **19**. *Stirtonia gibberulosa*, 1455-**L**; **20**. *Stirtonia indica*, 83.47-**AMH.** Scale = 1mm.

15



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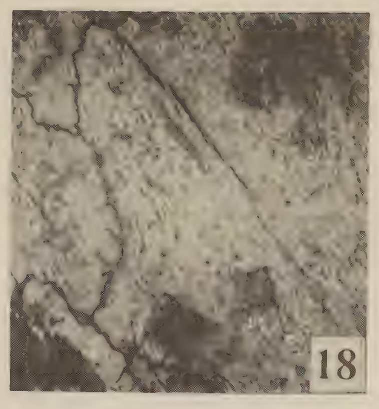

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distinct, well differentiated, rounded or orbicular, concolorous, slightly elevated, with brown spots, *c.* 0.5–1.5 mm in diameter, crystal, studded, *c.* 225–300 µm high. Asci subglobose to globose, not covered with algal layer, *c.* 83–108 x 33–72 µm in size. Ascospores ellipsoid or ovoid, 12–16-septate, often with middle locules larger and locules at the ends much narrower, curved or straight, *c.* 88–116 x 29–36 µm.

Chemistry: Thallus K-, P-, KC-, C-; three unidentified compounds present (det. C.F. Culberson).

Specimens examined: India, North Andaman, Diglipur Range, Milangram, P. G. PATWARDHAN & P. K. SETHY, 86.271, 86.347-**AMH**.

Remarks: *Stirtonia macrocarpa* is easily recognized by its distinct, concolorous, elevated, rounded fertile verrucae which become brown maculate when mature, and by its large, 12–16-septate ascospores.

Stirtonia marginata Groenh. ex Makhija & Patw. *sp. nov.*

[Figs.: 10, 22]

= *Stirtonia marginata* Groenh. *nomen nudum.*

Natuurk. Tijdschr. Nederlandsch. Indië **98**: 307, 1938 and *Handel. Achtste Nederlandsch-Indiasch. Natuurwetensch, Congr. Soerabaja*, p.45, 1938.

Type: East Java, Bay of Nglijep, South of Donomuljo, alt. 0–10 m, on tree, 21.8.1932, P. GROENHART, No.578-Holotype-**L** (!).

Thallus corticola, crustaceus, tenuissimus, griseo-albus, hypothallo nigricante limitatus, endophloeodes; pars ascigera externe non visa, microscopica, *c.* 85–110 µm alta; asci bitunicati crassitunicati, pyriformes vel subglobosi, dispersi in texturam laxam distributi, *c.* 50–77 x 50–66 µm; ascosporae, ellipsoideae, 8-septatae, *c.* 46–66 x 1–12 µm, cellula centralis ceteris major.

Thallus corticolous, crustose, thin, greyish-white, delimited by black hypothalloidal region at the periphery, totally endophloeodal; ascigerous parts of the thallus externally invisible, extensive, having groups of asci embedded in bark *c.* 85–110 µm thick. Asci pyriform to more or less globose, with a dome shaped extension of the endoascus, *c.* 70–90 x 50–66 µm. Ascospores ellipsoid, 8-septate, with central cell larger, *c.* 46–66 x 14–20 µm.

Chemistry: Thallus K-, C-, KC-, P-; no lichen substances present.

Figs.: 21-26. **21**. *Stirtonia macrocarpa*, 86.276-**AMH**; **22**. *Stirtonia marginata*, 578-**L**; **23**. *Stirtonia mellea*, s.n.-**L**; **24**. *Stirtonia obvallata,* s.n.-**BM**; **25**. *Stirtonia ramosa,* 85.1122-**AMH**; **26**. *Stirtonia santessonii*, 85.1985-**AMH**. Scale = 1mm

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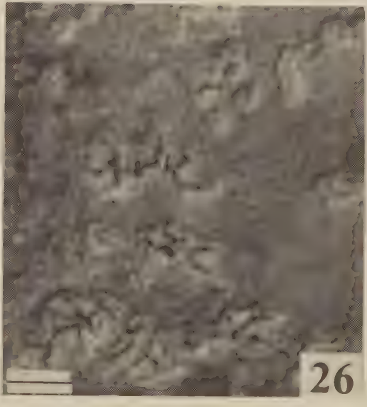
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Remarks: *Stirtonia marginata* seems closely related to *S. gibberulosa* from which it differs by its larger ascospores with the central cell slightly larger than the others (*c.* 2-3 times).

Stirtonia mellea Groenh. ex Makhija & Patw. *sp. nov.*

[Figs.: 11, 23]

= *Stritonia mellea* Groenh. *nomen nudum*

Natuurk. Tijdschr. Nederlandsch. Indië **98**: 307, 1938 and *Handel. Achtste Nederlandsch-Indiasch. Natuurwetensch. Congr. Soerabaja*, p. 415, 1938.

Type: East Java, Bay of Nglijep, South of Donomuljo, on tree, 25 July 1957, Alt. 0-10 m, P. GROENHART, No.1453-Holotype-**L** (!).

Thallus corticola, crustaceus, pallidus, vel pallido-viridis, laevigatus, effusus, toto endophloeodes; pars ascigera albida, ferrinosa, irregulariter elongata, fuscopunctata, macula, *c.* 0.25–5.0 mm longa et *c.* 0.25–3.5 mm lata, composita plus minusve laxe intertexta, *c.* 100–160 µm alta; asci bitunicati, crassitunicati, subglobosi, dispersi in textura laxam distributi, *c.* 115–135 x 90–105 µm; ascosporae ovatae, vel ellipsoideae, 9–13-septatae, *c.* 59–76 x 27–35 µm.

Thallus corticolous crustose, light yellow to light yellowish-green, smooth to effuse, totally endophloeodal; ascigerous parts of the thallus white, powdery, large, irregularly elongate, narrow patches with brown punctate areas representing asci all over the thallus, *c.* 0.25–5.0 mm long and *c.* 0.25–3.5 mm broad, *c.* 100–160 µm thick, studded with hyaline crystals and not covered with algal cells above. Asci ± globose, *c.* 115–135 x 90–105 µm. Ascospores ovoid to ellipsoid, 9–13-septate, with equal cells, *c.* 59–76 x 27–35 µm.

Chemistry: Thallus K-, C-, KC-, P-; unknown substance present indicated by pink spot on TLC plates above norstictic acid in BDA and below norstictic acid in HEF.

Specimens Examined: East Java, Bay of Serang; South of Bliter, on tree; alt. 0-10 m., 24.10.1937, P. GROENHART, No.4706-**L**.

Remarks: *Stirtonia mellea* is distinctly distinguished by its prominent fertile areas. which are externally visible as white, powdery, large, irregularly elongate, narrow foveolate areas on the thallus, and transversely 9–13-septate ascospores *c.* 59–76 x 27–35 µm, with equal cells.

In respect of the appearance of its ascigerous parts *S. mellea* more or less resembles *S. santessonii* , from which it can easily be distinguished by its ascospore characters. *S. santessonii* has invariably smaller (*c.* 33–50 x 13–17 µm) 7-septate ascospores with a larger terminal cell.

Stirtonia obvallata **(Stirt.) A.L. Sm.** [Figs.: 1, 2 , 12 & 24]

Trans. Brit. Mycol. Soc. **11**: 195, 1926.
= *Cryptothecia obvallata* Stirt.
Proc. Phil. Soc. Glasgow **10**: 319, 1879.

Type: India, Bengal, Chinsurah, Dr. G. WATT, s.n.-Lectotype-**GLAM**, Isolectotype-**BM** (!)

Thallus corticolous, crustose, white, effuse, thin, most of the part endophloeodal, composed of loosely interwoven hyphae; algal layer made up of the scattered, delicate algal cells; ascigerous parts of the thallus extensive, externally invisible, *c.* 135–185 µm thick. Asci globose, pedicellate, with a dome shaped extension of the endoascus, *c.* 88–113 x 55–72 µm in size, deeply embedded in the bark. Ascospores ellipsoid, hyaline, 7–9-septate, with subequal cells, *c.* 45–89 x 20–33 µm.

Chemistry: Thallus K-, C-, KC-, P-; no lichen substances present.

Remarks: While describing the new genus *Stirtonia*, A.L. Smith (1926) reported that "the species was labelled by Stirton, as *Cryptothecia obvallata* but not published. It was collected by G. Watt". However, it was validly published by Stirton (1879) as *Cryptothecia obvallata*.

Stirtonia ramosa **Makhija & Patw.** [Figs.: 13, 25]

Biovigyanam, **13**(2): 49, 1987.

Type: India, South Andaman, Alexandria Island, 6.3.1985, P.G. PATWARADHAN, M.B. NAGARKAR & P.K. SETHY 85.1122-Holotype-**AMH** (!), Isotype-**DUKE** (!).

Thallus corticolous, crustose, greenish grey, smooth to verruculose, *c.* 50–80 µm thick, determinated by black hypothalloidal region at the periphery; ascigerous parts of the thallus distinct, white, lirelline, branched, elevated, *c.* 160–230 µm high. Asci subglobose to globose, with dome shaped extension of the endoascus, *c.* 66–78 x 33–52 µm in size. Ascospores ovoid to oblong, 3–6-septate, upper cell or both the cells at the extreme are often larger with middle cells narrower, *c.* 43–63 x 17–23 µm.

Chemistry: Thallus K-, P-, KC+ red, C+ red; 4′-*O*-demethylsuperconfluentic and 2′-*O*-methylnorsuperphyllinic acids present (Culberson *et al.*, 1990).

Specimens examined: India, Little Andaman, Netaji Nagar, Krishna Nala, M.B. NAGARKAR & P.G. PATWARDHAN, 85.888, 85.9413-**AMH**. Middle Andaman, Betapur Range, Pitcher Nala, M.B. NAGARKAR & P.K. SETHY. 85.2460-**AMH**; Rangat Range, Yeratta, in moist-deciduous forest, M.B. NAGARKAR & P.K. SETHY, 85.2183, 85.2198-**AMH**; North Andaman, South

East of Arial Bay, On the way to Lamia Bay from Kalipur, in mixed forest, M.B. NAGARKAR & P.K. SETHY, 86.479, 86.480-**AMH**; Diglipur Range, Millangram, Evergreen forest, P.K. SETHY & P.G. PATWARDHAN, 86.272-**AMH**. South Andaman, South Creek, Baratang Island, P.G. PATWARDHAN & U.V. MAKHIJA, 87.530-**AMH**; Wrafters Creek, M.B. NAGARKAR & P.K. SETHY, 85.580-**AMH**.

Remarks: *Stirtonia ramosa* is characterized by its well-differentiated ascigerous parts, which are elevated, white, branched, and lirelline, unlike any other *Stirtonia* species. It further stands distinct in its chemical content.

Stirtonia santessonii **Makhija & Patw.** [Figs.: 14, 26]

Biovigyanam, **13**(2): 49, 1987.

Type: India, South Andaman, Redskin Island, 19.12.1985, M.B. NAGARKAR & P.G. PATWARDHAN, 85.1985- Holotype-**AMH** (!), Isotype-**DUKE** (!).

Thallus corticolous, crustose, yellowish grey to grey, sterile part of the thallus endophloeodal; ascigerous parts of the thallus delimited, well differentiated, white, elevated, rounded, linear or irregular, *c.* 0.5–1.2 mm across crystal studded, *c.* 90–180 µm high. Asci scattered in the ascigerous parts, subglobose, with the dome shaped extension of the endoascus at the apical region, *c.* 60–75 x 33–56 µm. Ascospores oblong, 7-septate, with upper most cell larger, *c.* 33–50 x 13–17 µm.

Chemistry: Thallus K-, P-, KC-, C-; three unidentified yellow pigments (det. C.F. Culberson).

Specimen examined: India, South Andaman, Redskin Island, M. B. NAGARKAR and P. G. PATWARDHAN - 85.1986-**AMH.**

Remarks: *Stirtonia santessonii*, is very similar to *Stirtonia ramosa* in having delimited and well-differentiated ascigerous parts, but differs in having uniformly 7-septate ascospores, invariably with upper most cell larger, and a thallus that lacks lichen substances apart from unidentified pigments.

EXCLUDED SPECIES

Stirtonia amazonica **Sambo**

Annalli di Botan. **22**: 24, 1940.

Type: Brazil (not seen).

Remarks: *Stirtonia amazonica* is perhaps an *Arthonia* (Santesson, 1945). However, no material of this species was available for our studies.

Stirtonia arthonioides **Groenh.** *nomen nudum*

Natuurk. Tijdschr. Nederlandsch. Indië **98**: 307, 1938 and *Handel. Achtste Nederlandsch-Indiasch. Natuurwetensch, Congr. Soerabaja,* p. 415, 1938..

Authentic specimen: East Java, Bay of Serang, South of Blitter, alt. 0-10 m, On tree, 28.8.1938, P. GROENHART No.3982-**L** (!).

Thallus corticolous, crustose, greyish-white, ± smooth, totally endophloeodal; algal layer not continuous and represented by a few cells inside the bark; ascomata immarginate, dark brown, punctate, aggregated, radially branched lirellae like structure, densely scattered all over the thallus, *c.* 0.35 mm across; epithecium brown, *c.* 7–13 µm thick; hymenium brown to hyaline, *c.* 50–76 µm tall; hypothecium not distinguishable indistinct, *c.* 10–15 µm. Asci bitunicate, thick-walled with a dome shaped extension of the endoascus at the top, pyriform to subglobose, *c.* 60–86 x 50–66 µm, K/I+ blue; paraphysoids branched and anastomosed, and coherent. Ascospores 8/ascus, hyaline, ellipsoid, or ovoid, transversely 6–11-septate, with 1 or 2 cells at the middle larger, *c.* 40–55 x 20–24 µm.

Chemistry: Thallus K-,C-, KC-, P-; no lichen substances present.

Remarks: *Stirtonia arthonioides* is one of the seven species of *Stirtonia* proposed by Groenhart (1938), but as *nomina nuda*.

Our critical examination of an authentic specimen (see above) of this species revealed that it belongs to *Arthonia*.

Stirtonia macrocephala **R. Sant.**

Symb. Bot. Upsal. **12**(1): 60. 1952.

Type: The Phillippines, Puerto Princesa, Palawan Island, On *Cleistanthus* sp. E.D. MERRILL, n. 12989-Holotype-**UPS** (!).

Specimens Examined: Borneo, Sg. Wain, 12 Km. from mouth upward Belinkpapan (E. Katai), Alt. 5 m. Very moist forest, A. KASTERMANS n. 6892-**UPS** ; British North Borneo, Elphinston prov. Tavao, A.D.E. ELMER no.20816 -**UPS**. New Guinea, N.E. New Guinea, Sepik River Yessan, about 300 miles from the sea elev. 45 ft. Albert W.C.T. HERRE. **UPS.** The Philippines, Island of Polillo, C.B. ROBINSON, Ex. Herb. Vainio-21596-**UPS**; Island of Polillo, I prov.; C.B. ROBINSON no.26385; Davao Province, Mindono - Hamington, alt. 323 n. G.E. EDANO. Ex. Herb. Philippine National Herbarium 14953- **UPS**. Polillo Island, C.B. ROBINSON I Knor. n. 21167; **UPS**; Luzon, Tayabas, Similoan trail, C.B. ROBINSON s.n. **UPS**; Leyte, Dagami, C.A. WENTZEL s.n. **UPS** (!). Sumatra, Ostikust V. Sumatra, Tamiang (near the border of Govt. Atjeh, alt. 0030 n. 1926. BJORN PALM No.59-**UPS**.

Remarks: On account of the ascocarps which are dark brown, with a white pruina, and especially the presence of a coherent basal part of fertile tissue that can be seen as a distinct, brown, continuous layer just above the algae, and also the ascospores which are tapering and macrocephelic, *S. macrocephala* cannot be placed in *Stirtonia*.

Recently, Lücking (1995) stated that there is little doubt that *S. macrocephala* R. Sant. is closely related to *Eremothecella macrosperma* and that the cross sections of ascomata are very similar, although by placing them in *Stirtonia* on the one hand and *Arthonia* (now *Eremothecella*) on the other hand, structural differences were indicated (Santesson, 1952). Lücking (1995), further stated that the white colour of the ascocarps in *Stirtonia macrocephala* is merely due to a well-developed, pruina-like cover.

We have seen no material of *Eremothecella* (*E. calamicola* and *E. macrosperma*) but from the descriptions of the species and the illustrations given by Lücking (1995) in his paper it appears possible that *Stirtonia macrocephala* closely resembles *E. macrosperma* on account of the type of ascospores.

Stirtonia monospora Awasthi & K.P. Singh.

Geophytology,**1**(2): 97, 1971.

Type: South India, Tamil Nadu, Palni Hills, along Kodaikanal road, Shembaganur, near silver cascade, alt. 6000 ft, Jan.2, 1970, D.D. AWASTHI & K.P.SINGH, No.70.49-Holotype-**LWU** (!).

Specimens Examined: India, South India, Palni hills; Shembagnur to Periakulum via short cut road, alt 5500-6000 ft., K.P. SINGH No. 70-893-Paratype-**LWG**.

Remarks: We have examined only two collections of the original material of *Stirtonia monospora* (Holotype & Paratype). However, on account of the structure of the ascocarps and especially the presence of strongly coherent interthecial tissue, the present species cannot be placed in the genus *Stirtonia* and is excluded from the genus.

Even after our critical examination of a large number of vertical sections of the ascomata it is not clear if the ascomta are aggregated in a stroma and if a proper exciple is present. However, what appeared to be a narrow, indistinct exciple could be seen in just a few thin sections. The ascospores observed were mostly transversely septate but a few had 1 or 2 vertical septa. Hence, the placement of this species must await the availability of more material. At present it can be said only that it is certainly not a *Stirtonia*.

Stirtonia sprucei R. Sant.

Symb. Bot. Upsal. **12**(1): 60,1952.

Type: Brazil, Para, Caripi, 1849 R. SPRUCE n. 119-**UPS** (!)

Specimens Examined: Brazil, Para Carpi, 1849, SPRUCE no. 115-**UPS**

Remarks: Almost all taxa of *Stirtonia* and *Cryptothecia* have been studied by us. With regard to the anatomy of the ascomata and the type of ascospores, this foliicolous species is misplaced in the genus *Stirtonia.*

Lücking (1995) found *Stirtonia sprucei* to be closely related to his newly described *Cryptothecia farkasiae* Lücking as both coincide in all important features and are externally impossible to distinguish. He further pointed out that the only difference between *S. sprucei* and *C. farkasiae* is in the spore septation but even that difference is not very great as, apart from the longitudinal septa, the spores of *C. farkasiae* are very similar to those of *Stirtonia sprucei.*

Lücking (1995), opined that both species should be united in one and the same genus perhaps separate from *Stirtonia.*

We understand from personal correspondence with Robert Lücking (1996) that an available generic name has been found for both these species, viz. *Amazonomyces* Bat. & Cavalc. (based on *Stirtonia sprucei*) and the necessary new combinations will be made in a forthcoming publication.

Stirtonia verruculosa **Groenh.** *nomen nudum*

Natuurk. Tijdschr. Nederlandsch-Indië **98**: 307, 1938 and *Handel. Achtste Nedrlandsch-Indiasch. Natuurwetensch, Congr. Soerabaja* p. 415, 1938.

Authentic specimen: East Java, Bay of Nglijep, South of Donomuljo, on tree, alt. 0-10 m, 4 Oct. 1934, P. GROENHART, No.693-Holotype-**L** (!).

Thallus corticolous, crustose, white to greyish-white, effuse, nitid, porose, verrucose, totally endophloeodal; algal layer distinctly seen inside the bark; ascomata pale brown to reddish brown, rounded, aggregated in highly elevated verrucae *c.* 0.25–1.0 mm across, I+ blue; epithecium pale brown, indistinct, studded with hyaline crystals, *c.* 10–13 μm thick; hymenium pale brown, *c.* 150–200 μm tall; hypothecium pale brown, not easily distinguishable from the hymenium *c.* 150–200 μm. Asci bitunicate, thick-walled, with a dome shaped extension of the endoascus, K/I+ blue but no zonal or ring formation, *c.* 59–73 x 50–66 μm; paraphysoids coherent, branched and anastomosed. Ascospores 8/ascus, hyaline, ellipsoid, transversely 8-septate, with middle cells larger, *c.* 43–53 x 13–23 μm.

Chemistry: Thallus K-, C-, KC-, P-; no lichen substances present.

Specimens Examined: Switzerland, Ticino, leg P. GROENHART, 1946, No. 91-**L**. (sterile)

Remarks: The presence of apothecioid fertile parts, branched, anastomosed and coherent paraphysoids and transversely septate, hyaline ascospores justify its placement in the genus *Arthonia*.

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DIDYMIUM SUBRETICULOSPORUM (MYXOMYCETES), A NEW SPECIES FOR AMERICA

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Abstract: We describe macro- and microscopically *Didymium subreticulosporum*, a species previously only collected in Europe on the Iberian Peninsula (Spain), but now found, for the first time, on the American Continent. SEM photomicrographs are included.

Keys words: *Didymium subreticulosporum*, *Myxomycetes*, taxonomy, chorology.

The study of the Myxomycetes of Baja California has experienced a small impetus in recent years. Recently, the importance of taxonomic and ecological studies has been realized in the states of Tlaxcala (Hernández-Cuevas & al., 1991; Rodríguez-Palma & Estrada-Torres, 1996) and Baja California Norte and Baja California Sur (Lizárraga & al., 1997; Moreno & al., 1997).

This paper contributes a new record for the state of Baja California and for the American Continent. It deals with *Didymium subreticulosporum*, a species validated in the *Abstr. 2nd. Intern. Congr. Syst. Ecol. Myxomycetes* (Moreno & al., 1996) and described and commented by Oltra & al. (1996).

The material of *Didymium subreticulosporum* is preserved in the herbarium of the Universidad de Alcalá (AH) and in the herbarium of Jardín Botanico de Madrid (MA-Fungi). The type of *D. atrichum* is in BPI.

***Didymium subreticulosporum* Oltra, G. Moreno & Illana, in Moreno, Castillo, Illana & Lizárraga, *Abstr. 2nd. Intern. Congr. Syst. Ecol. Myxomycetes*: 57. 1996. Figs. 1-6.**

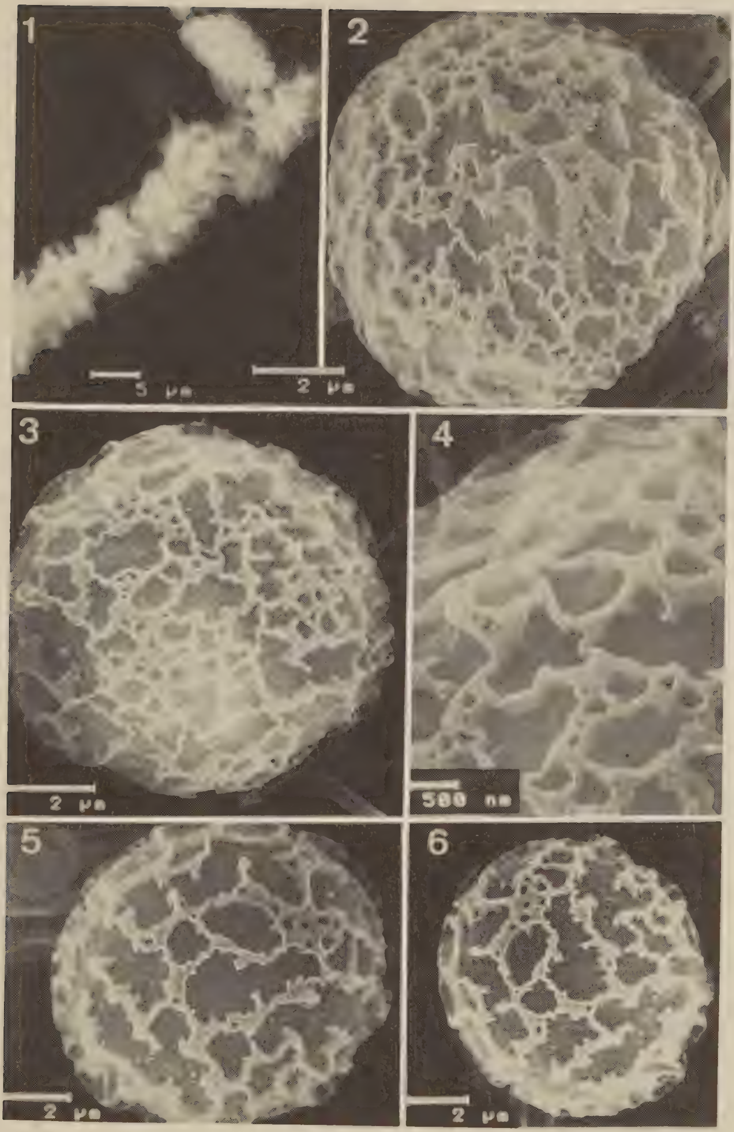
Collections examined. MEXICO: on fallen cladodes of *Opuntia* sp., Tijuana (Rancho los Alisos, road to valley Las Palmas), Baja California, 13.XI.1994, *leg.* M. Lizárraga & E. J. Torres, AH 21014. On fallen cladodes of *Opuntia maxima* Miller, Rosarito (Rancho el Paraiso, road to Rosarito-La Presa de Tijuana), Baja California, 16.III.1997, *leg.* M. Lizárraga & E. J. Torres, AH 22610. On fallen cladodes of *Opuntia maxima* Miller, Ensenada, Sierra de San Pedro Mártir (Rancho San Antonio), Baja California, 31.V.1997, *leg.* M. Lizárraga & G. Ruiz, AH 22450 duplo in MA-fungi 36743. SPAIN: on fallen cladodes of *Opuntia maxima* Miller, highway Rótova-Albaida, 30SYJ4315, Valencia, 12.VIII.1993, *leg.* M. Oltra, AH 19047 (holotype). *Idem,* 1.IX.1993, AH 19048. *Idem,* 20.IX.1993, AH 19049.

Other collections examined. *Didymium atrichum* Henney & Alexop. USA: mass spore inoculation on leaf of *Bauhinia* sp. from spores produced in agar culture, Texas, *leg.* M. R. Henney, BPI 749236 (holotype).

Sporocarps 0.7-2 mm tall, stipitate, in small groups,. Sporophores globose, 0.5-1 mm diam., sometimes fused or reniform; 1 x 1.5-2.5 mm diam., greyish white. Hypothallus dark, irregular. Stalks somewhat flattened, dark in reflected light, in transmitted light dark red-brown, with some adhering particles, plicate, sometimes sprinkled with crystals. Peridium nearly colourless above, sprinkled with crystals mostly smaller to, rarely, slightly larger than the spores and with a cartilaginous, slightly granular, deep-brown basal plate below; dehiscence irregular. Columella none. Capillitium formed by crystals of calcium carbonate, united to form "lines" or tubules fairly abundant, delicate, colourless, with elongate widenings holding stellate and nodular crystals, interlocked into rows, visible as white specks in the dehiscing sporophores, often forming a spiny pseudocolumella. Spores 9-11 µm diam., globose, black in mass, in transmitted light purplish-violet, reticulate, with tortuous rows of dark, confluent warts, which show a minutely crenulate margin in optical section; in SEM the spore ornamentation is banded-reticulate with irregular meshes. Plasmodium unknown.

Observations: *Didymium subreticulosporum* has, as the distinctive character, a capillitium formed not by hyaline filaments, as is common in the genus *Didymium*, but by crystals of calcium carbonate, united to form "lines" which project radially from the central part of the sporocarp (fig. 1). In the type collection, the spore ornamentation is formed by incomplete reticula of broad meshes (figs. 5-6), however, in the Mexican collection, the spore ornamentation, especially with SEM, appears to be formed by complete reticula of irregular meshes (figs. 2-4).

Didymium atrichum M. R. Henney & Alexop., described by Henney & al. (1980), is a species close to *D. subreticulosporum*, by its reticulate spore ornamentation but differs because it finally presents sessile, globose sporocarps to plasmodiocarps, which are scattered or clustered. The study of the holotype has shown us sporocarps badly developed, with the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Figs. 1-6: ***Didymium subreticulosporum*****.-** 1: Filament of the crystalline capillitium (AH 21014); 2-3: Reticulate spores (AH 21014); 4: Details of the spore ornamentation (AH 21014); 5-6: Subreticulate spores (type, AH 19047).

reticulum of the spores poorly defined and measurements very variable, which induced us to think that this species obtained in culture from spores, possibly presents a different morphology in nature, and was described from an aberrant form of fructification.

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A NEW SPECIES OF HEMIBELTRANIA ON CONVALLARIA KEISKEI

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ABSTRACT: *Hemibeltrania convallariae* sp. nov., associated with leaf blight of *Convallaria keiskei* Miq. is described, illustrated and compared with the known species of the hyphomycete genus *Hemibeltrania*.

During taxonomic studies on Korean hyphomycetous specimens deposited in the mycological herbarium of the Department of Agricultural Biology, Korea University, Seoul, Korea (SMK), a new *Hemibeltrania* species has been detected. In the present paper, this new species is described, illustrated and contrasted with other known species of *Hemibeltrania*.

Hemibeltrania convallariae H.D. Shin & U. Braun, sp. nov. (Fig. 1)

Maculae 2-10 cm diam., amphigenae, diffusae, orbiculares vel suborbiculares, atro-brunneae vel griseo-brunneae. Caespituli saepe hypophylli, interdum epiphylli vel caulicoli. Stroma nullum. Setae nullae; hyphopodia nulla. Conidiophora macronemata, ad 2 mm longa, 13-23 ㎛ lata, inferne saepe equaliter, superne inequaliter lata, apicem versus attenuata vel inflata, solitaria, simplicia vel ad apicem ramosa, recta, pallide olivaceo-brunnea, levia, 3-8 septata, ex cellulis basalibus, radiate lobatis oriunda. Cellulae conidiogenae polyblasticae, integratae, terminales, deinde intercalares, sympodiales, cylindricae, denticulatae (conicae vel cylindricae). Conidia solitaria, acropleurogena, simplicia, ovoidea vel cylindrica-ovoidea, interdum obpyriformia (immatura?), pallidissime olivacea vel subhyalina, continua, 14-24 x 10-15 ㎛, basi saepe minute apiculata.

Holotypus : On living leaves of *Convallaria keiskei* Miq. (Liliaceae), Korea, Pyongchang, 13 VI 1995, Shin (SMK 13533).
Isotypus : HAL

Leaf spots 2-10 cm in diam., amphigenous, diffuse, circular or subcircular, blackish brown to grayish brown. Caespituli mostly hypophyllous, occasionally epiphyllous or cauligenous. Stroma none. Setae and hyphopodia absent. Conidiophores macronematous, up to 2 mm long, 13-23 ㎛ wide, width usually uniform in the lower half, but wider or narrower towards the apex, solitary, unbranched or with one or a few branches near the apex, straight, pale olivaceous brown, smooth, 3-8-septate, arising from radially lobed basal cells. Conidiogenous cells polyblastic, integrated, terminal, becoming intercalary, sympodial, cylindrical, denticulate; denticles conical to cylindrical. Conidia solitary, acropleurogenous, simple, oval to cylindrical-oval, occasionally obpyriform (possibly immature), pale olivaceous or subhyaline, smooth, aseptate, 14-24 x 10-15 ㎛, often with a minute basal apiculus.

This fungus agrees well with the genus *Hemibeltrania* sensu Pirozynski (1963) in having macronematous conidiophores arising from radially lobed basal cells, conical to cylindrical denticles, and acro- pleurogenous aseptate conidia. The following *Hemibeltrania* species are known: *H. cinnamomi* (Deighton) Piroz. (Pirozynski, 1963: 32), *H. cymbiformis* Zucconi (1992: 145), *H. decorosa* Castañeda & W.B. Kendr. (1991: 57), *H. echinulata* P.M. Kirk (1983a: 455), *H. laxa* G.R.W. Arnold & Castañeda (in Castañeda & Arnold, 1985: 54), *H. mitratae* P.M. Kirk (1983b: 275), *H. navicularis*

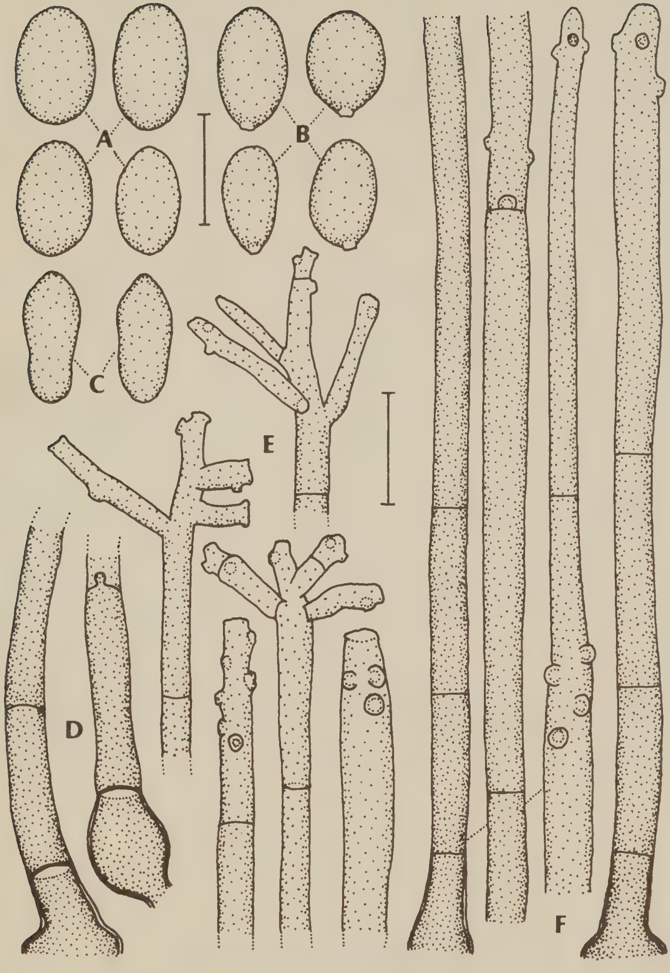

Fig. 1. *Hemibeltrania convallariae* sp. nov.: **A**. Mature conidia with rounded base. **B**. Mature conidia with minute apiculi. **C**. Immature conidia. **D**. Basal part of conidiophores. **E**. Apical part of conidiophores. **F**. Conidiophores. Bars indicate 20 μm for **A**–**C** and 50 μm for **D**–**F**.

B. Sutton (1977: 43), and *H. nectandrae* (Bat. & Maia) Piroz. (Pirozynski, 1963: 34). Based on its catenulate conidia, *H. navicularis* has been excluded from *Hemibeltrania* and placed in *Subramaniomyces* Mani Varghese & V.G. Rao (1980). *H. convallariae* differs from the other species of *Hemibeltrania* in having longer and wider conidiophores and oval to cylindrical-oval conidia, which are occasionally obpyriform when immature (Table 1).

Table 1. Morphological comparison between *Hemibeltrania* species.

Species	Conidia			Conidiophores	
	size(㎛)	shape	base	length(㎛)	width(㎛)
H. cinnamomi	12-16 x 10-12	obovoid	pointed	up to 250	4-5
H. convallariae	14-24 x 10-15	oval	rounded	up to 2240	13-23
H. cymbiformis	21-24 x 3-4.5	cymbiform	pointed	up to 140	2.2-4.5
H. decorosa	17-22 x 3.5	fusiform	pointed	up to 250	4-6.5
H. echinulata	12-14 x 5.5-7	obovoid	rounded	140-300	3.5-5
H. laxa	13-17 x 2-3	navicular-obclavate	pointed	50-350	3-7
H. mitratae	14-17 x 4.5-5.5	mitriform	rounded	35-85	3-4.5
H. navicularis	16-25 x 4-4.5	navicular	truncate	up to 120	4-4.5
H. nectandrae	15-23 x 10-13	limoniform	sub-truncate	up to 250	4-6

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MYCOTAXON

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FUNGI OF PARAGUAY. I. PRELIMINARY CHECK-LIST OF WOOD-INHABITING POLYPORES (APHYLLOPHORALES, BASIDIOMYCOTA)

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ABSTRACT: A revised check-list of 88 species of wood-inhabiting polypores is presented, 12 of these recorded for the first time for Paraguay. The new combinations **Polyporus bresadolianus** (Spegazzini) Popoff & Wright and **Trametes versicolor** f. **tucumanensis** (Rajchenb.) Wright & Popoff are proposed.

KEY-WORDS: Paraguay - Wood-inhabiting polypores - Aphyllophorales - Basidiomycota - Taxonomy.

Introduction

The bibliographical references on the mycobiota of Paraguay are scarce, specially those concerning wood-inhabiting polypores. C. Spegazzini (1883, 1884, 1888, 1889, 1891, 1919, 1922) was the first promoter of the knowledge of the fungi of Paraguay, and his work appeared in successive publications. He also made numerous collections, in addition to studying specimens of B. Balansa, W. Bertoni and J. Anisits, among others. Another important contribution was L. Romell's (1901) study of the collections made by G. Malme at the end of the 1800s.

All those collections were obtained mainly in localities of the Central, Paraguarí and Conception Departments, with a few specimens recorded from the Departments of Caaguazú, Cordillera, Guairá, Pte. Hayes, and San Pedro.

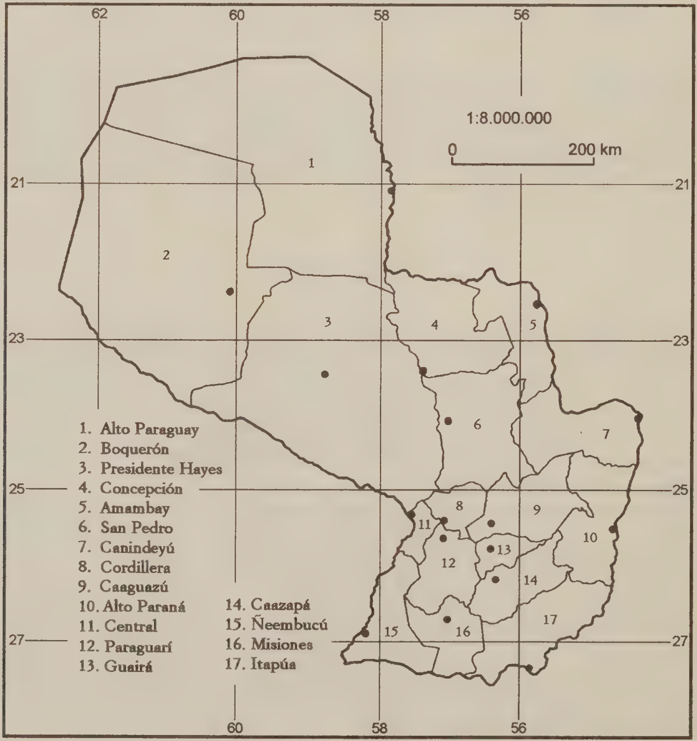
Following these valuable contributions, the study of the fungi of Paraguay was practically forgotten. Only for neighbouring regions, such as the NE of Argentina, can relatively recent bibliography on wood-inhabiting polypores be found (Lowe, 1963; Wright, Deschamps & Rovetta, 1973; Wright & Deschamps, 1975 and 1976/77; Bazzalo & Wright, 1982; Rajchenberg, 1982 and 1984; Blumenfeld, 1986; Wright, Deschamps & Blumenfeld -unpublished; Ibañez, 1995).

Sporadic collections were undertaken in the 1970s, but botanists of Paraguay and Argentina began systematic collecting in 1990. Thanks to this we now have a preliminary record for large part of Paraguay. Collections in localities of the Amambay, Alto Paraná, Caazapá, Alto Paraguay and Itapúa Departments have lately been added.

The authors have updated the names of all the polypores recorded and have verified their identification in all possible cases. Many specimens, previously cited, have not been located in the herbaria consulted and perhaps are lost. The specimens found in the Herbarium of the Institute "Carlos Spegazzini" (LPS) are indicated with their corresponding number. From the collection studied by Romell (S), only those we have been able to verify are indicated with S!

To avoid mentioning the extensive synonyms of most of the species, only the basionym and the taxonomic synonyms under which they were recorded for Paraguay in Spegazzini's and Romell's papers are mentioned. Specimens that lack number collection are annotated "w/n", and those which lack collection date "w/d". First records for Paraguay are marked *.

The nomenclature adopted is based mainly on that used by Ryvarden (1991), and suprageneric taxa are arranged according to Hawksworth & al. (1995) and are here distributed among several orders formerly included in **Aphyllophorales s.l.** The study of the material followed the usual methodology for these fungi (Ryvarden & Johansen, 1980; Gilbertson & Ryvarden, 1987).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3. Presidente Hayes
4. Concepción
5. Amambay
6. San Pedro
7. Canindeyú
8. Cordillera
9. Caaguazú
10. Alto Paraná
11. Central
12. Paraguarí
13. Guairá
14. Caazapá
15. Ñeembucú
16. Misiones
17. Itapúa

STEREALES

Hyphodermataceae

* **Schizopora paradoxa** (Fr.) Donk, Persoonia 5: 76. 1967.
≡ *Hydnum paradoxum* Fr., Syst. Mycol. 1: 424. 1821.
ITAPÚA, Isla Yacyretá, 56°41'W 27°24'S, 25.XI.1988, *O.Popoff et al. 571* (CTES).

Meruliaceae

Gloeoporus dichrous (Fr.) Bres., Ann. Mycol. 14: 230. 1916.
≡ *Polyporus dichrous* Fr., Syst. Mycol. 1: 364. 1821.
= *Gloeoporus candidus* Spegazzini, Anales Soc. Ci. Argent. 17: 70. 1884.
CENTRAL, pr. Asunción, 1891, *J. Anisits 69* (as *Gloeoporus candidus* in Spegazzini, 1919). PARAGUARÍ, Guarapí, 1880, *B. Balansa 3398* (LPS 24911) (as *G. candidus* in Spegazzini, 1884).
Obs.: Spegazzini's type of *G. candidus* verified by Rajchenberg and Wright (1987).

Sistotremataceae

Trechispora regularis (Murr.) Liberta, Canad. J. Bot. 51: 1878. 1973.
≡ *Poria regularis* Murr., Mycologia 12: 87. 1920.
= *Poria tenuissima* Spegazzini, Anales Mus. Nac. Hist. Nat. Buenos Aires 31: 371. 1922.
CENTRAL, Asunción, Quinta Caballero, VII.1919, *C. Spegazzini w/n* (LPS 25513) (as *Poria tenuissima* in Spegazzini 1922).
Obs.: Lowe (1963) recorded *Poria regularis (= P. tenuissima)* for Paraguay. Spegazzini's type of *P. tenuissima* was verified by Rajchenberg (1984) and Rajchenberg and Wright (1987).

Steccherinaceae

* **Junghuhnia undigera** (Berk.) Ryv., Mycotaxon 20: 359. 1984 (as *J. undigerus*).
≡ *Polyporus undigerus* Berk., J. Linn. Soc., Bot. 10:317. 1868.
CENTRAL, Asunción, VII.1919, *C. Spegazzini w/n* (LPS 25349, as *Polystictus* sp.)

GANODERMATALES

Ganodermataceae

Amauroderma auriscalpium (Pers.) Torrend, Brotéria Sér. Bot. 18: 131. 1920.
≡ *Polyporus auriscalpium* Pers. in Gaudichaud, Voyage aut. Monde Bot., p. 169. 1827.
PARAGUARÍ, Guarapí, IV.1879, *B. Balansa 3361* (as *P. auriscalpium* in Spegazzini, 1883).

Amauroderma pseudoboletus (Spegazzini) Furtado, Mem. New York Bot. Gard. 34: 67. 1981.
≡ *Polyporus pseudoboletus* Spegazzini, Anales Soc. Ci. Argent. 16: 279. 1883. *Fomes*, Spegazzini, Rev. Argent. Hist. Nat. 1: 101-111. 1891. *Ganoderma*, Spegazzini, Bol. Acad. Nac. Ci. 23: 365-609. 1919.
PARAGUARÍ, pr. Guarapí, IV.1879, *B. Balansa 3362* (LPS 24861) (as *P. pseudoboletus* in Spegazzini, 1883) and *B. Balansa 3909* (as *G. pseudoboletus* in Spegazzini, 1919).
Obs.: Spegazzini's type of *P. pseudoboletus* was studied by Rajchenberg and Wright (1987).

Ganoderma australe (Fr.) Pat., Bull. Soc. Mycol. France 5: 67. 1889.
≡ *Polyporus australis* Fr., Elench. Fung. 1: 108. 1828.
PARAGUARÍ, ad Cerro Negro, 01.VIII. 1893, *G. Malme w/n* (Romell, 1901). PTE. HAYES, "Gran Chaco, ad Pilcomayo", 07.IX.1893, *G. Malme w/n* (Romell, 1901).
Obs.: The authors maintain a conservative treatment of the species of *Ganoderma*, until the taxonomy of the genus is clarified.

Ganoderma lipsiense (Batsch) Atk., Ann. Mycol. 6 (3): 189. 1908.
≡ *Boletus lipsiensis* Batsch, Elenchus Fungorum, p.130. 1786.
= *Ganoderma applanatum* (Pers.) Pat., Bull. Soc. Mycol. France 5: 67, 1889.
CONCEPCIÓN, Colonia Risso, Río Apa, II.1887, *L. Balzán w/n* (as *G. applanatum* in Spegazzini, 1919).

Ganoderma lucidum (W. Curt.: Fr.) Karst., Rev. Mycol. (Toulouse) 3 (9): 17, 1881.
≡ *Polyporus lucidus* W. Curt.: Fr., Syst. Mycol. 1: 353. 1821.
PARAGUARÍ, Paraguarí, 07.VIII. 1893, *G. Malme 1090* (Romell, 1901).

Ganoderma oerstedii (Fr.) Torrend, Brotéria Sér. Bot. 17: 37. 1920.
≡ *Fomes oerstedii* Fr., Nov. Symb. Mycol., p. 63. 1855.
= *Polyporus pachyotis* Spegazzini, Anales Soc. Ci. Argent. 16: 283. 1883 (*fide* Spegazzini).
PARAGUARÍ, pr. Paraguarí, 1880, *B. Balansa w/n* (as *P. pachyotis* in Spegazzini, 1883 and as *G. oerstedi* in Spegazzini, 1919).
Obs.: The holotype of *P. pachyotis* is not extant at LPS. In 1919, Spegazzini reidentified his species with the above name.

HYMENOCHAETALES

Hymenochaetaceae

Cyclomyces iodinus (Mont.) Pat., Essai Taxon., p. 98. 1900.
≡ *Polyporus iodinus* Mont., Ann. Sci. Nat. Bot., Ser. 2 (16): 108. 1841. *Polystictus*, Mont., Syll. Crypt. p. 167. 1856.
PARAGUARÍ, Paraguarí and Guarapí, 1880-1883, *B. Balansa 3911 and 3397* (as *Polyporus tabacinus* in Spegazzini., 1883, but reidentified as *Polystictus iodinus* in Spegazzini, 1919); Paraguarí, 01-05.VIII.1893, *G. Malme 423, 430 B and 431* (as *Chaetoporus jodinus* Mont. in Romell, 1901).

Phellinus calcitratus (Berk. & Curt.) Ryv., Norweg. J. Bot. 19: 234. 1972.
≡ *Polyporus calcitratus* Berk. & Curt., J. Linn. Soc., Bot. 10: 314. 1868.
CENTRAL, pr. Asunción, 1891-1893, *J. Anisits 118 and 561* (as *P. calcitratus* in Spegazzini, 1919).

Phellinus conchatus (Pers.: Fr.) Quél., Elench. Fung., p. 173. 1886.
≡ *Boletus conchatus* Pers., Obs. Mycol. 1: 24. 1796; *Polyporus*, Pers.: Fr., Syst. Mycol. 1: 376. 1821; *Fomes*, Gill., Champ. France, p. 685. 1878.
CENTRAL, pr. Asunción, 1892, *J. Anisits 227* (as *F. conchatus* in Romell, 1901).

Phellinus contiguus (Fr.) Pat., Essai Taxon., p. 97. 1900.
≡ *Polyporus contiguus* Fr., Syst. Mycol. 1: 378. 1821.

= *Polyporus cryptacanthus* Mont., Ann. Sci. Nat. Bot., Ser. 3 (5): 369. 1846. *Poria*, Mont., Cent. VII, p. 37. 1856.
= *Poria bicolor* Bres., Ann. Mycol. 18: 37. 1920.
PARAGUARÍ, pr. Guarapí, 1880, *B. Balansa 3392* (as *P. cryptacanthus* in Spegazzini, 1883 and as *P. cryptacantha* in Spegazzini, 1919).
Obs.: Lowe (1963) recorded *P. bicolor* for Paraguay.

Phellinus fastuosus (Lev.) S. Ahmad, Monogr. biol. Soc. Pakistan 6: 56. 1972.
≡ *Polyporus fastuosus* Lev., Ann. Sci. Nat. Bot., Ser. 3(2): 190. 1844; *Fomes* Cooke., Grevillea 14: 18. 1885. *Mucronoporus,* Cooke, Grevillea 8: 75. 1879.
CENTRAL, pr. Asunción, w/d, *J. Anisits 232* (as *F. fastuosus* in Spegazzini, 1919). PARAGUARÍ, Paraguarí, 05.VIII.1893, *G. Malme 437* (as *M. fastuosus* in Romell, 1901).

Phellinus gilvus (Schw.: Fr.) Pat., Essai Taxon., p. 97. 1900.
≡ *Boletus gilvus* Schw., Schriften Naturf. Ges. Leipzig 1: 96. 1822; *Polyporus,* Schw.: Fr., Elench. Fung. 1: 104. 1828; *Chaetoporus,* Schw.: Fr., Hym. Europ., p. 548. 1874.
= *Polyporus licnoides* Mont., Ann. Sci. Nat. Bot., Ser. 2 (13): 204. 1840; *Polystictus*, Fr., Nova Acta Regiae Soc. Sci. Upsal., Ser. 3 (1): 76. 1851; *Chaetoporus,* Sacc., Syll. Fung. 6: 281. 1888.
= *Polyporus spurcus* Lev., Ann. Sci. Nat. Bot., Ser. 3 (5): 135. 1846.
= *Polyporus balansae* Spegazzini, Anales Soc. Ci. Argent. 16: 42. 1883.
CENTRAL, Asunción, 1893, *J. Anisits 542* (as *P. gilvus* in Spegazzini, 1919); Ibid. , 1891-1893, *J. Anisits 52, 108 and 561* (as *Polyporus lichnoides* in Spegazzini, 1919); Ibid. , 1893, *J. Anisits 478* (as *P. spurcus* in Spegazzini, 1919); Ibid. , II.1920, *C. Spegazzini w/n* (as *Polystictus lichnoides* in Spegazzini, 1922) (LPS 25362); Ibid. , 29.VIII.1893, *G. Malme 1044*; Areguá pr. Asunción, 22.VII.1893, *G. Malme 1005*, 21.VIII.1893, *G. Malme 1053* (as *C. licnoides* in Romell, 1901); Ipacaray, w/d, *W. Bertoni 1163* (LPS 25203); San Tomas, 08.VIII.1893, *G. Malme 424 and 424 B*; Trinidad pr. Asunción, 25.VII.1893, *G. Malme ?B* (as *C. licnoides* in Romell, 1901); Ibid., w/d, *K. Fiebrig, w/n* (LPS 25201); Ibid., w/d, *P. Zamboni w/n* (LPS 25358); Asunción, Trinidad, Ipacary, San Antonio, Estación Sosa, Pacú-Cuá, VII.1919-II.1920, *C. Spegazzini w/n* (as *P. gilvus* in Spegazzini, 1922). CONCEPCIÓN, Colonia Risso, 23.IX.1893, *G. Malme 463* (as *C. licnoides* in Romell, 1901). PARAGUARÍ, pr. Guarapí, 1880, *B. Balansa 3396* (LPS 24978) (as *P. balansae* in Spegazzini, 1883); pr. Paraguarí, VII.1883, *B. Balansa 3912* (LPS 24976) (as *P. gilvus* in Spegazzini, 1883); Cerro Negro, 01.VIII.1893, *G. Malme 411* (as *C. gilvus* in Romell,1901); Paraguarí, 01.VIII.1893, *G. Malme 414* (as *C. licnoides* in Romell, 1901). PTE. HAYES, Pilcomayo, 04.IX.1893, *G. Malme w/n* (as *C. licnoides* in Romell, 1901).
Obs.: Spegazzini's type of *P. balansae* was studied by Rajchenberg and Wright (1987).

Phellinus wahlbergii (Fr.) Reid, Contr. Bolus. Herb. 7: 97. 1975.
≡ *Trametes wahlbergii* Fr., Kongl. Vetensk. Acad. Handl., p. 131. 1848.
= *Mucronoporus zelandicus* Cooke, Grevillea 8: 75. 1879.
CONCEPCIÓN, Cnia. Risso, 23.IX.1893, *G. Malme 462*, and 07.X.1893, *G. Malme 472* (as *M. zealandicus* in Romell, 1901).

Phylloporia capucina (Mont.) Ryv., Nordic J. Bot. 2: 77. 1982.
≡ *Polyporus capucinus* Mont., Ann. Sci. Nat. Bot., Ser. 4 (5): 369. 1857.

CENTRAL, Asunción, VII-X.1919 and II.1920, *C. Spegazzini w/n* (LPS 24940 and 24953) (as *P. capucinus* in Spegazzini, 1922).

PORIALES

Coriolaceae

* **Antrodia ramentacea** (Berk. & Br.) Donk, Persoonia 4 (3): 339. 1966.
≡ *Polyporus ramentaceus* Berk. & Br., Ann. Mag. Nat. Hist., Ser. 5 (3): 210. 1879.
ITAPÚA, Isla Yacyretá, 56°41'W 27°24'S, in tropical rain forest, 25.XI.1988, *O. Popoff et al. 570* (CTES).

Ceriporia xylostromatoides (Berk.) Ryv. & Johan., Prelim. Polyp. Fl. East Afr., p. 276. 1980.
≡ *Polyporus xylostromatoides* Berk., Lond. J. Bot. 2: 637. 1843.
= *Poria subambigua* Bres., Ann. Mycol. 9: 268. 1911.
CENTRAL, pr. Asunción, 1891-1893, *J. Anisits 63, 199, 547* (as *P. subambigua* in Spegazzini, 1919). PTE. HAYES, Pto. Militar, Estancia Casuariaga, in tropical rain forest, 09.XII.1989, *L. Ferraro et al. 3829* (CTES).

Coriolopsis byrsina (Mont.) Ryv., Norweg. J. Bot. 19(3-4): 230. 1972.
≡ *Polyporus byrsinus* Mont., Ann. Sci. Nat. Bot., Ser. 2 (17): 126. 1842.
CENTRAL, San Lorenzo, Ciudad Univ., 24.XI.1975, *J. Wright et al. P-2822* (BAFC as *Coriolopsis crocata*). PARAGUARÍ, pr. Guarapí, 1880, *B. Balansa 3393* (LPS 25353) (as *P. byrsinus* in Spegazzini, 1883); Paraguarí, 6.VIII.1893, *G. Malme 434* (as *P. byrsinus* in Romell, 1901).

Coriolopsis floccosa (Jungh.) Ryv., Norweg. J. Bot. 19: 230. 1972.
≡ *Polyporus floccosus* Jungh., Verh. Batav. Genootsch. Kunsten 17: 49. 1839.
= *Polyporus phytoderma* Spegazzini, Anales Soc. Ci. Argent. 16: 51. 1883. *Poria*, Spegazzini, Bol. Acad. Nac. Ci. 23: 429. 1919.
CENTRAL, pr. Asunción, 1891, *J. Anisits 20* (as *Poria phytoderma* in Spegazzini, 1919). PARAGUARÍ, pr. Guarapí, 1880, *B. Balansa 3391* (LPS 25546) (as *Polyporus phytoderma* in Spegazzini, 1883, and as *Poria phytoderma* in Spegazzini, 1919).
Obs.: Lowe (1963) recorded *Poria phytoderma* Spegazzini for Paraguay. Spegazzini's type of *Polyporus phytoderma* was verified by Rajchenberg and Wright (1987).

Coriolopsis polyzona (Pers.) Ryv., Norweg. J. Bot. 19 (3-4): 230. 1972.
≡ *Polyporus polyzonus* Pers. in Gaudichaud, Voyage aut. Monde Bot., p. 170. 1827.
= *Trametes occidentalis* Kl., Linnaea 8: 486. 1833. *Polyporus,* Fr., Epicr. Syst. Mycol. p. 491. 1838.
= *Polyporus lundii* Fr., Epicr. Syst. Mycol. p. 479. 1838.
ALTO PARANÁ, Reserva Biológica Itabó, in tropical rain forest, 09.X.1990, *O. Popoff, G. Caballero et M. Gullón 950* (CTES). CENTRAL, Asunción, II.1920, *C. Spegazzini w/n* (LPS 25403); Ibid., X.1919, *Ipse* (LPS 25390); Areguá pr. Asunción, 28.VIII.1893, *G. Malme 441* (as *Polyporus occidentalis* in Romell, 1901); San Lorenzo, Ciudad Univ., 24.XI.1975, *J. Wright et al. P-2819* (BAFC as *C. occidentalis*); Trinidad, w/d, *K. Fiebrig w/n* (LPS 25380). CONCEPCIÓN, Colonia Risso pr. Ría Apa, 27.IX.1893, *G. Malme 469* (as *P. occidentalis* in Romell, 1901). ITAPÚA, Isla Yacyretá, 56°41'W 27°24'S, in tropical rain forest, 25.XI.1988, *O. Popoff et al. 561* (CTES and BAFC). PARAGUARÍ, pr. Guarapí, 1880, *B. Balansa 3394* (as *P. lundii* in Spegazzini, 1883),

Guarapí, 1880, *B. Balansa 3399* (LPS 25407) (as *T. occidentalis* in Spegazzini, 1883); pr. Yaguarón, aest. 1877, *B. Balansa 2704* (as *P. lundii* in Spegazzini, 1891). PTE. HAYES, "ad Pilcomayo territorii Gran Chaco", IX.1893, *G. Malme 1101* (as *P. occidentalis* in Romell, 1901). "y por todo el Paraguay durante los años 1891-93", *J. Anisits 8, 33, 54, 71 90, 114, 142, 213, 215, 354, 468, 570* (as *Polystictus occidentalis* in Spegazzini, 1919).

Daedalea aethalodes (Mont.) Rajchenberg, Canad. J. Bot. 64: 2130. 1986.

≡ *Trametes aethalodes* Mont., Ann. Sci. Nat. Bot., Ser. 4 (5): 370. 1857.

= *Trametes argentina* Spegazzini, Anales Mus. Nac. Hist. Nat. Buenos Aires 6: 173. 1898.

= *Chaetoporus melleo-fulvus* Romell, Kongl. Svenska Vetenskapsakad. Handl. 26, Ser. 3 (16): 35. 1901.

ALTO PARAGUAY, Cerro León, “sobre tronco caído y seco”, w/d, *A. Schinini 19677* (BAFC 28753). CENTRAL, Asunción, 1892, *J. Anisits 172 and 186* (LPS 30482 and 30481) (as *T. argentina* in Spegazzini, 1919); pr. Villa Morra, 1892, *J. Anisits 34* (as *T. aethalodes* in Spegazzini, 1919); Ipacary, w/d, *W. Bertoni 1158* (LPS 30483, as *Trametes citrina* Bres.). PARAGUARÍ, Paraguarí, 21.VII.1893, *G. Malme 403;* 31.VIII.1893, *G. Malme 422* (as *C. melleo-fulvus* in Romell, 1901).

Daedalea quercina L.: Fr., Syst. Mycol. 1: 333. 1821.

CENTRAL, pr. Asunción, 1893, *J. Anisits 560* (LPS 21509), (Spegazzini, 1919).

Obs.: Spegazzini (1926) thought it must have been introduced with imported wood.

Datronia caperata (Berk.) Ryv., Mycotaxon 23: 172. 1985.

≡ *Polyporus caperatus* Berk., Ann. Mag. Nat. Hist., Ser. 6 (3): 391. 1893.

= *Polyporus subtropicalis* Spegazzini, Anales Soc. Ci. Argent. 16: 46. 1883.

= *Polystictus cirrifer* Berk. & Curt., J. Linn. Soc., Bot. 10: 314. 1868.

CAAGUAZÚ, Parque Nac. Guayaquí, 09.VI.1968, *B. de Martinez w/n* (BAFC as *Hexagonia caperata).* CENTRAL, Villa Morra, w/d, *J. Anisits 388 and 564* (as *P. cirrifer* in Spegazzini, 1919); Asunción, w/d, *C. Spegazzini, w/n* (LPS 25325); San Antonio, Pacú Cuá, Antequera e Ipacaray, verano 1919-1920, *W. Bertoni 1159 and 1184* (LPS 25321 and 25320) (as *P. cirrifer* in Spegazzini, 1922). PARAGUARÍ, Cerro Negro, 01.VIII.1893, *G. Malme 412* (as *P. cirrifer* in Romell, 1901); pr. Guarapí, IV.1879, *B. Balansa 3400* (LPS 25351) (as *P. subtropicalis* in Spegazzini, 1883 and *P. caperatus* in Spegazzini, 1919); Paraguarí, 27.VII.1893, *G. Malme 397*; 3.VIII.1893, *G. Malme 425* (as *P. caperatus* in Romell, 1901).

Obs.: Larsen and Cobb-Poulle (1990) stated that the Spegazzini’s name is a *Phellinus*, obviously a mistake, since Rajchenberg and Wright (1987) examined the type of *P. subtropicalis*, and corroborate it as *Hexagonia caperata*. Both Spegazzini and Romell (op. cit.) published the species of Berkeley and Curtis as *P. cirrifer*, although Ryvarden (1984 and 1991) recorded it as *P. cirrhiferus*.

* **Diacanthodes novo-guineensis** (Henn.) Fidalgo, Rickia 1: 149. 1962.

≡ *Polyporus novo-guineensis* Henn. in Schum. & Hollr., Beiheft Nachr. Kaiser Wilhelms Land Bism.-archip., p. 6. 1889.

CENTRAL, Asunción, 09.VI.1973, *A. Schinini 12168* (BAFC, CTES).

Echinoporia aculeifera (Berk. & Curt.) Ryv., Mycotaxon 19: 330. 1984.

≡ *Trametes aculeifera* Berk. & Curt., J. Linn. Soc., Bot. 10: 319. 1868. *Polystictus,* Sacc., Syll. Fung. 6: 237. 1888.

= *Polystictus harotianus* Spegazzini, Rev. Mycol. (Toulouse) 11: 94. 1889.

CENTRAL, pr. Luque and Asunción, 1891, *J. Anisits 75;* 1893, *J. Anisits 301* (as *P. aculeifer* in Spegazzini, 1919). PARAGUARÍ, pr. Guarapí, 1884, *B. Balansa 2809* (LPS 25350) (as *P. harotianus* in Spegazzini, 1889 and as *P. aculeifer* in Spegazzini, 1919); 1884, *B. Balansa w/n* (as *P. harotianus* in Spegazzini, 1891).

Obs.: Spegazzini's type of *P. harotianus* was studied by Rajchenberg and Wright (1987).

Fomes fasciatus (Sw.: Fr.) Cooke, Grevillea 14: 21. 1885.

≡ *Polyporus fasciatus* Sw.: Fr., Syst. Mycol. 1: 373. 1821.

= *Fomes subfomentarius* Romell, Kongl. Svenska Vetenskapsakad. Hand. 26, Ser. 3 (16): 35. 1901.

ALTO PARANÁ, Reserva Biológica Itabó, in tropical rain forest, 24.V.1989, *A. Krapovickas & C. Cristóbal 43773* (CTES). CENTRAL, San Lorenzo and San Antonio, X.1919, *C. Spegazzini w/n* (as *F. fasciatus* in Spegazzini, 1922); pr. Asunción, w/d, *J. Anisits 233* (LPS 16717); Villa Morra, II.1920, *C. Spegazzini w/n* (LPS 16712 and 16716). PARAGUARÍ, San Tomás, 04.VIII.1893, *G. Malme 427* (as *F. subfomentarius* in Romell, 1901); Lago Ypoá, in repair forest, XI.1988, *F. Mereles 1230* (CTES).

Fomitopsis feei (Fr.) Kreisel, Ciencias (Havana), Ser. 4, 16: 83. 1971.

≡ *Polyporus feei* Fr., Linnaea 5: 518. 1830.

= *Polyporus rubidus* Berk., London J. Bot. 6: 500. 1847.

CONCEPCIÓN, Colonia Risso, Río Apa, II.1887, *L. Balzán w/n* (as *P. rubidus* in Spegazzini, 1919).

Hexagonia hydnoides (Sw.: Fr) M. Fidalgo, Mem. New York Bot. Gard. 17 (2): 35-108. 1968.

≡ *Boletus hydnoides* Swartz., Nov. Gen. Sp. Plant. Prodromus, p. 149. 1788. *Polyporus*, Fr., Syst. Mycol. 1: 362. 1821. *Trametes*, Fr., Epicr. Syst. Mycol. p. 490. 1838.

= *Polyporus verrucoso-hirtus* Spegazzini, Anales Soc. Ci. Argent. 17: 46. 1884. *Polystictus,* Spegazzini, Anales Soc. Ci. Argent. 26: 7. 1888. *Trametes,* Spegazzini, Rev. Argent. Hist. Nat. 1: 101. 1891.

AMAMBAY, Cerro Corá, in riparian forest of Aquidabán river, 22.VIII.1980, *A. Schinini 21566* (CTES). CENTRAL, Asunción, II.1920, *C. Spegazzini w/n* (LPS 25431 as *Polystictus trichomallus*); Areguá pr. Asunción, 21.VI.1893, *G. Malme 1046* (as *T. hydnoides* in Romell, 1901); San Antonio, pr. Asunción, 20.VII.1893, *C. Lindman 392 B* (as *T. hydnoides* in Romell, 1901). PARAGUARÍ, Guarapí, VII.1879, *B. Balansa 3363* (as *Polyporus verrucoso-hirtus* in Spegazzini, 1884; as *Polystictus verrucoso-hirtus* in Spegazzini, 1888; *as T. verrucoso-hirtus* in Spegazzini, 1891); VII.1881, *B. Balansa 3386* (LPS 30499) (as *T. hydnoides* in Spegazzini, 1883); Paraguarí, 03.VIII.1893, *G. Malme 422* (as *T. hydnoides* in Romell, 1901). "Paraguay", w/d, *C. Spegazzini w/n* (LPS 30503). "En todo el Paraguay", 1891-1893, *J. Anisits 51* (LPS 30505), *J. Anisits 177* (LPS 30504), *J. Anisits 317* (LPS 30507), *J. Anisits 512* (LPS 30502) (as *T. hydnoides* in Spegazzini, 1919).

Hexagonia papyracea Berk., Ann. Mag. Nat. Hist., Ser. 1 (10): 379. 1843.

= *Hexagonia variegata* Berk., Ann. Mag. Nat. Hist., Ser. 2 (9): 196. 1852.

ALTO PARAGUAY, Cerro León, 60°15'W 20°26'S, in tropical rain forest, 01.X.1979, *A. Schinini 19678* (CTES). AMAMBAY, Parque Nac. Cerro Corá, camino al Cerro Muralla, IX.1988, *L. Ferraro et al. 3366* (CTES). CENTRAL, pr. Asunción, 1893, *J.*

Anisits 563 (as *H. variegata* in Spegazzini, 1919); Areguá, 20.VIII.1893, *G. Malme 1019* (as *H. scutigera* in Romell 1901, S!); Nueva Italia, Granja Mara, 22.VIII.1969, *E. Bordas w/n* (BAFC 22721). CONCEPCIÓN, Colonia Risso, 07.X.1893, *G. Malme 1022* (as *H. variegata* in Romell 1901). PARAGUARÍ, pr. Guarapí, 1879, *B. Balansa 3481 and 3401* (as *H. scutigera* in Spegazzini, 1883 and Spegazzini, 1891; as *H. variegata* in Spegazzini, 1919); Paraguarí, 01.VIII.1893, *G. Malme 410* (as *H. variegata* in Romell, 1901). SAN PEDRO, Villa of San Pedro, IX.1919, *W. Bertoni 1130* (LPS 25758) (as *H. variegata* in Spegazzini, 1922).
Obs.: Spegazzini (1919) explains that he used in his previous publications the wrong name *H. scutigera* Fries for the indicated materials.

Hydnopolyporus fimbriatus (Fr.) Reid, Persoonia 2: 151. 1962.
≡ *Polyporus fimbriatus* Fr., Linnaea 5: 520. 1830. *Polystictus,* Fr., Epicr. Syst. Mycol. p. 476. 1838.
CENTRAL, Asunción, 1893, *J. Anisits 567 and 569* (LPS 25000) (as *Polystictus fimbriatus* in Spegazzini, 1919). GUAIRÁ, Colonia Independencia, 56°13'W 25°45'S, in tropical rain forest, 19.XII.1986, *A. Schinini 25335* (CTES). PARAGUARÍ, Guarapí, IV.1876, *B. Balansa 3703 and 3352* (as *P. fimbriatus* in Spegazzini, 1919).

* **Navisporus sulcatus** (Lloyd) Ryv., Nordic J. Bot. 3: 412. 1983.
≡ *Trametes sulcata* Lloyd, Mycol. Writ. 7: 1146. 1922.
ALTO PARANÁ, Reserva Biológica Itabó, in tropical rain forest, 09.X.1990, *O. Popoff, G. Caballero et M. Gullón 772, 825, 841, 858 and 947* (CTES).

* **Oxyporus latemarginatus** (Dur. & Mont. ex Mont.) Donk, Persoonia 4: 342. 1966.
≡ *Polyporus latemarginatus* Dur. & Mont., Syll. Crypt. p. 163. 1856.
ALTO PARANÁ, 15 km NE of Hernandarias, pr. Río Pirá Pytá, in tropical rain forest, 11.X.1990, *O. Popoff, G. Caballero et M. Gullón 917* (CTES).

Perenniporia martiusii (Berk.) Ryv., Norweg. J. Bot. 19: 143. 1972.
≡ *Polyporus martius* Berk., Hooker's J. Bot. Kew Gard. Misc. 8: 198. 1856.
= *Polyporus homodermeus* Mont., Ann. Sci. Nat. Bot., Ser. 4 (5): 368. 1857; *Fomes*, Sacc., Syll. Fung. 6: 166. 1888.
ALTO PARANÁ, Reserva Biológica Itabó, in tropical rain forest, 09.X.1990, *O. Popoff, G. Caballero et M. Gullón 817 and 826* (CTES). CENTRAL, Asunción, X.1919, *C. Spegazzini w/n* (LPS) (as *F. homodermeus* in Spegazzini, 1922); Salinas, II.1920, *C. Spegazzini w/n* (BAFC and LPS 24970).
Obs.: Ryvarden published this species as *P. martius.* The correct epithet could be *martia* but this distorts the surname of the botanist to whom the species was dedicated.

Perenniporia medulla-panis (Jacq.: Fr.) Donk, Persoonia 5: 76. 1967.
≡ *Polyporus medulla-panis* Jacq.: Fr., Syst. Mycol. 1: 380. 1821. *Poria,* Bres., Acad. Rover. Agiati Atti 3 (3): 84. 1897.
= *Poria chromatica* (Berk. & Cooke) Cooke, J. Linn. Soc., Bot. 15: 384. 1877.
= *Poria unita* (Pers.) Cooke, J. Linn. Soc., Bot. 15: 384. 1877.
CENTRAL, Asunción, VII-X.1919, *C. Spegazzini w/n* (BAFC and LPS 25498, 25499, 25500) (as *Poria medulla-panis* in Spegazzini, 1922); pr. Asunción, 1893, *J. Anisits 565* (as *P. chromatica* in Spegazzini, 1919). PARAGUARÍ, Guarapí, IX.1883, *B. Balansa 3974* (LPS 25543) (as *Poria medulla-panis* in Spegazzini, 1919).
Obs.: Lowe (1963) recorded *P. unita* for Paraguay.

Perenniporia ohiensis (Berk.) Ryv., Norweg. J. Bot. 19: 143. 1972.
≡ *Trametes ohiensis* Berk., Grevillea 1: 66. 1872.
CONCEPCIÓN, Colonia Risso, "in silva", 22.IX.1893, *G. Malme 467* (as *Ganoderma ohiense* in Romell, 1901). PARAGUARÍ, Paraguarí, "in silva", 05.VIII.1893, *G. Malme 433 B* (as *G. ohiense* in Romell, 1901).

Perenniporia tephropora (Mont.) Ryv., Norweg. J. Bot. 19: 233. 1972.
≡ *Polyporus tephroporus* Mont., Ann. Sci. Nat. Bot., Ser. 3 (4): 358. 1845.
= *Polyporus lividus* Kalchbrenner, Grevillea 10: 103. 1882. *Fomes,* Sacc., Syll. Fung. 6: 206. 1888.
CENTRAL, Asunción, X.1920, *C. Spegazzini w/n* (LPS 24920) (as *F. lividus* in Spegazzini, 1922). ALTO PARANÁ, 15 km NE of Hernandarias, in tropical rain forest, 11.X.1990, *O. Popoff, G. Caballero et M. Gullón 926* (CTES).

Pycnoporus sanguineus (L.: Fr.) Murr., Bull. Torrey Bot. Club 31: 421. 1904.
≡ *Boletus sanguineus* L., Sp. Plant. 2 ed. p. 1646. 1762. *Polyporus,* Fr., Syst. Mycol. 1: 371. 1821. *Polystictus,* Fr., Nov. Symb. p. 75. 1851.
CENTRAL, Areguá, pr. Asunción, 27.VII.1893, *G. Malme 383 B* (as *Polyporus sanguineus* in Romell, 1901), Asunción, 1891, *J. Anisits 15* (as *Polystictus cinnabarinus* in Spegazzini, 1919). PARAGUARÍ, pr. Guarapí, 1881, *B. Balansa 3385* (as *Polyporus sanguineus.* in Spegazzini, 1883); Paraguarí, 01.VIII.1893, *G. Malme 410 B* (as *P. sanguineus* in Romell, 1901). "Común en todo el Paraguay", 1891-1893, *J. Anisits 32, 75, 181, 216 and 513* (as *Polystictus sanguineus* in Spegazzini, 1919). "Paraguay", w/d, *W. Bertoni, w/n* (LPS 25425). "Por todo el Paraguay", VII.1919-II.1920, *C. Spegazzini w/n* (as *P. sanguineus* in Spegazzini, 1922).

Rigidoporus lineatus (Pers.) Ryv., Norweg. J. Bot. 19: 236. 1972.
≡ *Polyporus lineatus* Pers. in Gaudichaud, Voyage aut. Monde Bot., p. 174. 1827.
= *Polyporus zonalis* Berk., Ann. Mag. Nat. Hist., Ser. 1 (10): 375. 1843.
CENTRAL, Asunción, II.1920, *C. Spegazzini w/n* (LPS 25458) (as *P. zonalis* in Spegazzini, 1922).

* **Rigidoporus ulmarius** (Fr.) Imazeki, Bull. Gov. Forest. Exp. Sta. 57: 119. 1952.
≡ *Polyporus ulmarius* Sow.: Fr., Syst. Mycol. 1: 365. 1821.
CAAGUAZÚ, Parque Nac. Guayaquí, X.1967, *B. de Martínez w/n* (BAFC). ALTO PARANÁ, Reserva Biológica Limoy, in tropical rain forest, 1990, *G. Caballero w/n* (CTES).

Tinctoporellus epimiltinus (Berk. & Br.) Ryv., Trans. Brit. Mycol. Soc. 73: 18. 1979.
≡ *Polyporus epimiltinus* Berk. & Br., J. Linn. Soc., Bot. 14: 54. 1873.
= *Poria borbonica* Pat., J. Bot. (Morot) 4: 198. 1890.
ITAPÚA, Isla Yacyretá, 56°41'W 27°24'S, in tropical rain forest, 25.XI.1988, *O. Popoff et al. 550* (CTES and BAFC).
Obs.: Lowe (1963) recorded *P. borbonica* for Paraguay.

* **Trametes cubensis** (Mont) Sacc., Syll. Fung. 9: 198. 1891.
≡ *Polyporus cubensis* Mont., Ann. Sci. Nat. Bot., Ser. 2 (8): 364. 1837.
ALTO PARANÁ, Reserva Biológica Itabó, 10.X.1990, *O. Popoff, G. Caballero et M. Gullón 867* (CTES). CENTRAL, San Antonio, pr. Asunción, VII.1893, *C. Lindman 389 B et 392* (as *Fomes plebejus* in Romell, 1901, S!).

Obs.: The specimens at S correspond to *C. Lindman 389 B* and *G. Malme 392*, although the numbers recorded in Romell (1901) were transcribed; Romell's identification as *F. plebejus* appears to be incorrect.

Trametes elegans (Spreng.: Fr.) Fr., Epicr. Syst. Mycol. p. 492. 1838.
≡ *Daedalea elegans* Spreng.: Fr., Syst. Mycol. 1: 335. 1821.
= *Daedalea ambigua* Berk., Hooker's J. Bot. Kew Gard. Misc. 4: 305. 1845. *Trametes,* Fr., Nova Acta Regiae Soc. Sci. Upsal., Ser. 3 (1): 96. 1851.
CENTRAL, Asunción, X.1919, *C. Spegazzini w/n* (LPS 25817); pr. Asunción, 1892, *J. Anisits 190* (as *T. ambigua* in Spegazzini, 1919). PARAGUARÍ, Guarapí, VII.1879, *B. Balansa 3389* (LPS 25901). SAN PEDRO, Antequera, 28.VIII.1919, *W. Bertoni 1085* (LPS 25833), 10.IX.1919, *W. Bertoni 1134* (LPS 25834).

Trametes membranacea (Sw.: Fr.) Kreisel, Ciencias (Havana), Ser. 4 (16): 83. 1971.
≡ *Polyporus membranaceus* Fr., Syst. Mycol. 1: 370. 1821.
= *Polyporus tenuis* Link: Sacc., Syll. Fung. 6: 288. 1888.
CENTRAL, pr. Villa Morra, 1893, *J. Anisits 54* (as *P. tenuis* in Spegazzini, 1919).

Trametes pavonia (Hook.) Ryv., Norweg. J. Bot. 19: 237. 1972.
≡ *Boletus pavonius* Hook. in Kunth, Syn. Pl. 1: 10. 1822. *Polystictus*, Cooke, Grevillea 14 (71): 83. 1886.
CENTRAL, pr. Asunción, 1893, *J. Anisits 537 and 580* (as *P. pavonius* in Spegazzini, 1919).

Trametes scabrosa (Pers.) G. H. Cunn., Bull. N. Z. Dept. Sci. Industr. Res. 164: 162. 1965.
≡ *Polyporus scabrosus* Pers. in Gaudichaud, Voyage aut. Monde Bot., p. 172. 1827.
= *Trametes cornea* Pat., J. Bot. (Morot) 4: 16. 1890.
PARAGUARÍ, Paraguarí, 23.VII.1893, *G. Malme 402* (as *T. cornea* in Romell, 1901).

Trametes sclerodepsis Berk., Hooker's J. Bot. Kew Gard. Misc. 8: 236. 1856.
CONCEPCIÓN, Colonia Risso, 19.X.1893, *G. Malme 1021* (as *Polyporus sclerodepsis* in Romell, 1901, S!).

Trametes velutina (Pers.:Fr.) Pilát, Atlas Champ. Europ. 3: 268. 1939.
≡ *Polyporus velutinus* Pers.:Fr., Syst. Mycol. 1: 368. 1821.
PARAGUARÍ, Paraguarí, III-VIII.1893, *G. Malme 393* (S!), *413 B* and *422 C* (as *P. velutinus* in Romell 1901).

Trametes versicolor (L.: Fr.) Pilát, Atlas Champ. Europ. 3: 261. 1939.
≡ *Polyporus versicolor* L.: Fr., Syst. Mycol. 1: 368. 1821.
CORDILLERA, Piribebuy, 01.XI. 1883, *B. Balansa 4093* (as *Hexagona versicolor* in Spegazzini, 1888). PARAGUARÍ, pr. Paraguarí, VII.1883, *B. Balansa 3910* (LPS 25286 as *Trametes pectunculus*), (as *P. versicolor* in Spegazzini, 1883); VIII.1893, *G. Malme 418, 1045 and 1068* (as *Polystictus decipiens* Schw. in Romell, 1901, S!).
Obs.: The specimens of G. Malme 418, 1045 and 1068, correspond to *Coriolus versicolor* (L.:Fr.) Quél. f. *tucumanensis* Rajchenb.; we therefore propose ***Trametes versicolor*** f. ***tucumanensis*** (Rajchenb.) Wright & Popoff **nov. comb.** Basionym: *Coriolus versicolor* f. *tucumanensis* Rajchenb., *Bol. Soc. Argent. Bot.* 21(1-4): 41, 1982. It is generally admited that the genus *Coriolus* is a synonym of *Trametes*.

Trametes villosa (Sw.: Fr.) Kreisel, Ciencias (Havana), Ser. 4 (16): 84. 1971.
≡ *Polyporus villosus* Fr., Syst. Mycol. 1: 344. 1821.
= *Polyporus pinsitus* Fr., Elench. Fung. 1: 95. 1828. *Polystictus*, Fr., Nova Acta Regiae Soc. Sci. Upsal., Ser. 3 (1): 88. 1851.
= *Hexagonia friesiana* Spegazzini, Anales Soc. Ci. Argent. 17: 69. 1884.
CENTRAL, Asunción, VII-X.1919-1920, *C. Spegazzini w/n* (LPS 25258) (as *Polystictus pinsitus* in Spegazzini, 1922); Ibid. , 21.VII.1893, *G. Malme 379*; San Antonio, 20.VII.1893, *C. Lindman 836 B* (as *Polyporus pinsitus* in Romell, 1901); Trinidad, w/d, *K. Fiebrig, w/n* (LPS 25260); Villa Morra, w/d, *C. Spegazzini w/n* (LPS 25303). CORDILLERA, Piribebuy, 01.XI.1883, *B. Balansa 4089* (as *H. friesiana* in Spegazzini, 1888). PARAGUARÍ, pr. Paraguarí, VI.1883, *B. Balansa 3909* (LPS 25292) (as *Polyporus umbonatus* Fr. in Spegazzini, 1883); pr. Guarapí, 1879, *B. Balansa 3402* (LPS 25302) (as *H. friesiana* in Spegazzini, 1883); *"Yaguarón, aest. 1877 et Guarapí, aut. 1883, sine num."* (as *P. umbonatus* Fr. in Spegazzini, 1891); Cerro Negro, 08.VIII.1893, *G. Malme 439* (as *P. pinsitus* in Romell, 1901). "en todo el Paraguay", 1891-1893, *J. Anisits 14, 76, 93, 194, 237, 366 and 432* (as *Polystictus pinsitus* in Spegazzini, 1919).
Obs.: Spegazzini's type of *H. friesiana* was studied by Rajchenberg and Wright (1987).There would be other Balansa collection numbered *3909* as *Ganoderma pseudoboletus*.

Trichaptum byssogenum (Jungh.) Ryv., Norweg. J. Bot. 19: 237. 1972.
≡ *Polyporus byssogenus* Jungh., Verh. Batav. Genootsch. Kunsten 17: 43. 1838.
= *Trametes versatilis* Berk., Hooker's J. Bot. Kew Gard. Misc. 1: 50. 1849. *Polystictus*, Fr., Nova Acta Regiae Soc. Sci. Upsal., Ser. 3 (1): 92. 1851. *Polyporus*, Romell, Kongl. Svenska Vetenskapsakad. Handl. 26, Ser. 3 (16): 35, 1901.
CENTRAL, pr. Villa Morra and Asunción, 1892-1893, *J. Anisits 390 and 553* (as *T. versatilis* in Spegazzini, 1919); Asunción, X.1919, *C. Spegazzini w/n* (LPS 25475 and 25449) (as *Polystictus versatilis* in Spegazzini, 1922). CONCEPCIÓN, Colonia Risso pr. Río Apa, 23.IX.1893, *G. Malme 464* (as *Polyporus versatilis* in Romell, 1901). PARAGUARÍ, pr. Guarapí, 1879, *B. Balansa 3403* (as *T. versatilis* in Spegazzini, 1919); Paraguarí, VIII.1893, *G. Malme 413 and 433* (as *P. versatilis* in Romell, 1901).

Trichaptum fumoso-avellaneum (Romell) Rajchenb. & Bianch., Nordic J. Bot. 11 (2): 225. 1991.
≡ *Trametes fumoso-avellanea* Romell, Kongl. Svenska Vetenskapsakad. Handl. 26, Ser. 3 (16): 37. 1901.
CONCEPCIÓN, Colonia Risso pr. Río Apa, 22.IX.1893, *G. Malme 461* (as *T. fumoso-avellanea* in Romell, 1901).

Trichaptum perrottetii (Lév.) Ryv., Norweg. J. Bot. 19: 237. 1972.
≡ *Polyporus perrottetii* Lév., Ann. Sci. Nat. Bot., Ser. 3 (2): 195. 1844.
= *Polyporus trichomallus* Berk. & Mont., Ann. Sci. Nat. Bot., Ser. 3 (11): 238. 1849.
ALTO PARANÁ, 15 km NE of Hernandarias, pr. Pirá Pytá river, in tropical rain forest, 11.X.1990, *O. Popoff, G. Caballero et M. Gullón 927 and 982*, (CTES). CENTRAL, Asunción, II.1920, *C. Spegazzini w/n* (LPS 25052); Asunción, Jard. Bot. Trinidad, II.1920, *K. Fiebrig w/n* (LPS 25430) (as *P. trichomallus* in Spegazzini,1922). CONCEPCIÓN, Colonia Risso pr. Río Apa, 22.IX.1893, *G. Malme 464* (as *P. trichomallus* in Romell 1901). PARAGUARÍ, Paraguarí, 05.VIII.1893, *G. Malme 435* (as *P. trichomallus* in Romell 1901).

Trichaptum sector (Ehrenb.: Fr.) Kreisel, Ciencias (Havana), Ser. 4 (16): 84. 1971.
≡ *Polyporus sector* Ehrenb.: Fr., Syst. Mycol. 1: 505. 1821. *Polystictus*, Fr., Epicr. Syst. Mycol, p. 480. 1838.
= *Polyporus floridanus* Berk., Fung. Brit. Mus. p. 376. 1843.
= *Polyporus ludens* Spegazzini, Anales Soc. Ci. Argent. 17: 44. 1883. *Polystictus,* Spegazzini, Anales Soc. Ci. Argent. 26: 8. 1888.
= *Polystictus fulvicolor* Spegazzini, Anales Soc. Ci. Argent. 26: 7. 1888.
= *Polystictus fontanai* Spegazzini, Anales Mus. Nac. Hist. Nat. Buenos Aires 6: 168. 1898. *Daedalea,* Spegazzini, Bol. Acad. Nac. Ci. 23: 409. 1919.
CENTRAL, Asunción, II.1920, *C. Spegazzini w/n* (LPS 25456); pr. Asunción, 1891, *J. Anisits 167* (LPS 21518) (as *D. fontanai* in Spegazzini, 1919); Ipacaray, VII.1919, *W. Bertoni 1160* (LPS 25361) (as *Polystictus ludens* in Spegazzini, 1922); Trinidad pr. Asunción, 25.VII.1893, *G. Malme 384* (as *Polyporus sector* in Romell, 1901). CORDILLERA, pr. Piribebuy, 01.XI.1883, *B. Balansa 4096* (as *Polystictus ludens* in Spegazzini, 1888), *B. Balansa 4098* (LPS 25399 and 25400) (as *Polyporus sector* in Spegazzini, 1888 and 1919), *B. Balansa 4099* (LPS 25397) (as *P. fulvicolor* in Spegazzini, 1888). PARAGUARÍ, pr. Guarapí, 1880, *B. Balansa 3395* (LPS 25398) (as *P. ludens* in Spegazzini, 1883 and *P. sector* in Spegazzini, 1919); Paraguarí, 03.VI.1893, *G. Malme 422 B* (as *Polyporus sector* in Romell, 1901);); San Tomás, 03.VIII. 1893, *G. Malme 420* (as *P. floridanus* in Romell, 1901, S!); pr. Yaguarón, aut. 1877, *B. Balansa 2556* (as *Polystictus ludens* in Spegazzini, 1891). SAN PEDRO, Antequera, IX.1919, *W. Bertoni 1138* (LPS 25288) (as *P. sector* in Spegazzini, 1922).
Obs.: Spegazzini's types of *P. fulvicolor* and *P. fontanai* were studied by Rajchenberg and Wright (1987).

Grammotheleaceae

Grammothele subargentea (Spegazzini) Rajchenberg, Mycotaxon 17: 280. 1983.
≡ *Poria subargentea* Spegazzini, Rev. Argent. Hist. Nat. 1: 104. 1891.
PARAGUARÍ, Cerro Yaguarón, 23.II.1884, *B. Balansa 4309* (LPS 25486) (as *P. subargentea* in Spegazzini 1891).

Polyporaceae

Echinochaete brachyporus (Mont.) Ryv., Bull. Jard. Bot. Belg. 48: 101. 1978.
≡ *Polyporus brachyporus* Mont., Ann. Sci. Nat. Bot., Ser. 4 (1): 131. 1854.
= *Favolus balansae* Spegazzini, Rev. Mycol. (Toulouse) 11: 94. 1889.
= *Favolus princeps* Berk. & Curtis, J. Linn. Soc., Bot. 11: 317. 1869.
PARAGUARÍ, Guarapí, 1884, *B. Balansa w/n* (LPS 21523) (as *F. balansae* in Spegazzini, 1889); pr. Guarapí, 1880, *B. Balansa 3342* (as *F. princeps* in Spegazzini 1891).
Obs.: Spegazzini's type of *F. balansae* was studied by Rajchenberg and Wright (1987). *Balansa 3342* (LPS 21527) is type of *Favolus bresadolianus* Spegazzini, 1926.

* **Polyporus arcularius** Batsch: Fr., Syst. Mycol. 1: 342. 1821.
ALTO PARANÁ, Reserva Biológica Itabó, in tropical rain forest, 09.X.1990, *O. Popoff, G. Caballero et M. Gullón 829 and 846* (CTES).

* **Polyporus badius** (S. F. Gray) Schw., Trans. Amer. Philos. Soc. (New Ser.) 4: 155. 1832.
≡ *Grifola badia* S. F. Gray, Nat. Arrang. Br. Pl. 1: 644. 1821.

PARAGUARÍ, Guarapí, 1880, *B. Balansa 3396* (BAFC).
Obs.: There is another Balansa collection numbered 3396 as *Polyporus balansae* (= *Phellinus gilvus*) at LPS.

Polyporus blanchettianus Berk. & Mont., Ann. Sci. Nat. Bot., Ser. 3 (11): 238. 1849.
CENTRAL, Villa Morra, 1893, *J. Anisits 451* (Spegazzini, 1919).

Polyporus bresadolianus (Spegazzini) Popoff & Wright **nov. comb.**
Basionym: *Favolus bresadolianus* Spegazzini, Bol. Acad. Nac. Ci. 28: 353. 1926.
= *Favolus paraguayensis* Spegazzini, Anales Soc. Ci. Argent. 17: 71. 1884.
PARAGUARÍ, Guarapí, 1880, *B. Balansa 3342* (LPS 21527) (as *F. bresadolianus* in Spegazzini, 1926); pr. Guarapí, IV.1879, *B. Balansa 3340* (in Spegazzini, 1891); pr. Paraguarí, V.1883, *B. Balansa 3906* (LPS 21545) (as *F. paraguayensis* in Spegazzini, 1884).
Obs.: *Polyporus paraguayensis* (= *Polyporus udus* Jungh. according to Rajchenberg and Wright, 1987) is a name used by Spegazzini (1883); therefore we choose *F. bresadolianus* as basionym for the new combination. Núñez and Ryvarden (1995) have recently included *F. paraguayensis* as a synonym of *Polyporus tenuiculus* (Beauvois) Fr. This seems untenable and we believe *F. paraguayensis* is an autonomous taxon as stated by Rajchenberg and Wright (op. cit.). There would be other Balansa collection numbered 3342 as *Favolus hispidulus* (= *P. tenuiculus*).

Polyporus ciliatus Fr.: Fr., Syst. Mycol. 1: 349. 1821.
= *Polyporus guarapiensis* Spegazzini, Anales Soc. Ci. Argent. 26: 6. 1888.
PARAGUARÍ, pr. Guarapí, X.1883, *B. Balansa 4090* (LPS 25776) (as *P. guarapiensis* in Spegazzini, 1888).
Obs.: Spegazzini's type of *P. guarapiensis* was studied by Rajchenberg and Wright (1987).

Polyporus dictyopus Mont., Ann. Sci. Nat. Bot., Ser. 2 (3): 349. 1835.
= *Polyporus parvimarginatus* Spegazzini, Anales Soc. Ci. Argent. 16: 280. 1883.
PARAGUARÍ, pr. Guarapí, I.1880, *B. Balansa 3408* (as *P. parvimarginatus* in Spegazzini, 1883).
Obs.: Spegazzini's type of *P. parvimarginatus* was studied by Rajchenberg and Wright (1987).

Polyporus guyanensis Mont., Ann. Sci. Nat. Bot., Ser. 2 (13): 201. 1840. *Leucoporus*, Spegazzini, Bol. Acad. Nac. Ci. 23: 413. 1919.
CENTRAL, pr. Luque, 1892, *J. Anisits 442* (as *L. guyanensis* in Spegazzini, 1919).

Polyporus repando-lobatus Spegazzini, Anales Soc. Ci. Argent. 26: 7. 1888.
PARAGUARÍ, pr. Guarapí, X.1883, *B. Balansa 4090* (LPS 25782), (Spegazzini, 1888).
Obs.: Spegazzini's type was studied by Rajchenberg and Wright (1987). There is another Balansa collection numbered 4090 as *Polyporus guarapiensis* (= *P. ciliatus*) at LPS. See also *P. udus*.

Polyporus spegazzinianus Bres. Ann. Mycol. 18: 32. 1920. *Leucoporus*, Spegazzini, Bol. Acad. Nac. Ci. 23: 414. 1919.
CENTRAL, Villa Morra, 1873, J. *Anisits 403* (as *L. spegazzinianus* in Spegazzini, 1919).

Polyporus tenuiculus (Beauv.) Fr., Syst. Mycol. 1: 344. 1821.
≡ *Favolus tenuiculus* Beauvois, Fl. Oware Benin Afriq. 1: 74. 1806.
= *Favolus brasiliensis* (Fr.) Fr., Elench. Fung. 1: 44. 1828.
= *Favolus flaccidus* Fr., Linnaea 5: 511. 1830.
= *Favolus tessellatus* Mont., Ann. Sci. Nat. Bot., Ser. 2 (9): 84. 1838.
= *Favolus fissus* Lév., Ann. Sci. Nat. Bot., Ser. 3 (2): 201. 1844.
= *Favolus alutaceus* Berk. & Mont., Ann. Sci. Nat. Bot., Ser. 2 (11): 240. 1849.
= *Favolus hispidulus* Berk. & Curt., J. Linn. Soc., Bot. 10: 321. 1868.
= *Favolus speciosus* Spegazzini, Anales Soc. Ci. Argent. 17: 71. 1884.
= *Favolus fimbriatus* Spegazzini, Anales Soc. Ci. Argent. 17: 72. 1884.
CENTRAL, Villa Morra, 1891-1894, *J. Anisits 310 and 463* (LPS 21553) 1893, (as *F. tessellatus* in Spegazzini, 1919); Luque, Villa Morra and Asunción, 1891-1894, *J. Anisits 238 and 419* (LPS 21520 and 21519) (as *F. alutaceus* in Spegazzini, 1919). PARAGUARÍ, pr. Guarapí, 06.IV.1879, *B. Balansa 3336* (as *F. flaccidus* in Spegazzini, 1891); pr. Guarapí, 30.V.1883, *B. Balansa 3918* (LPS 21552) (as *F. speciosus* in Spegazzini, 1883); 17.VI.1879, *B. Balansa 3339* (as *F. tessellatus* in Spegazzini, 1891); pr. Paraguarí, VI.1883, *B. Balansa 3907* (LPS 21531) (as *F. fimbriatus* in Spegazzini, 1883); Guarapí, VI.1883, *B. Balansa 3905* (as *F. fissus* Lév. in Spegazzini, 1883); 1880, *B. Balansa 3342* (as *F. hispidulus* in Spegazzini, 1891); Paraguarí, 27.VII.1893, *G. Malme 394* (as *F. europaeus* in Romell, 1901, S!).
Obs.: Spegazzini's types of *F. fimbriatus* and *F. speciosus* were studied by Rajchenberg and Wright (1987).

* **Polyporus tricholoma** Mont., Ann. Sci. Nat. Bot., Ser. 2 (8): 365. 1837.
ALTO PARANÁ, Reserva Biológica Itabó, in tropical rain forest, 09.X.1990, *O. Popoff, G. Caballero et M. Gullón 782* (CTES).

Polyporus udus Jungh., Tijdschr. Natuurl. Gesch. Physiol. 7: 289. 1840.
= *Bresadolia paradoxa* Spegazzini, Anales Soc. Ci. Argent. 16: 277. 1883.
= *Polyporus paraguayensis* Spegazzini, Anales Soc. Ci. Argent. 16: 278. 1883.
Leucoporus, Spegazzini, Bol. Acad. Nac. Ci. 23: 413. 1919.
PARAGUARÍ, pr. Paraguarí, III.1883, *B. Balansa 3913* (LPS 15714) (as *B. paradoxa* in Spegazzini, 1883); Guarapí, XII.1881, *B. Balansa 3364* (LPS 25781) (as *P. paraguayensis* in Spegazzini, 1883) and *B. Balansa 4090* (as *L. paraguayensis* in Spegazzini, 1919).
Obs.: Spegazzini's types were studied by Rajchenberg and Wright (1987).

Polyporus virgatus Berk. & Curt., J. Linn. Soc., Bot. 10: 304. 1868.
≡ *Polyporus guaraniticus* Spegazzini, Anales Soc. Ci. Argent. 16: 278. 1883.
GUAIRÁ, pr. Villa Rica, Sta. Bárbara, jan. 1882, *B. Balansa 3365* (LPS 25783) (as *P. guaraniticus* in Spegazzini, 1883).
Obs.: Spegazzini's type of *P. guaraniticus* was studied by Rajchenberg and Wright (1987).

Pseudofavolus miquelii (Mont.) Pat., Essai Taxon., p. 81. 1900.
≡ *Polyporus miquelii* Mont., Ann. Sci. Nat. Bot., Ser. 3 (4): 357. 1845.
= *Favolus daedaloides* Spegazzini, Rev. Argent. Hist. Nat. 1: 108. 1891.
PARAGUARÍ, pr. Guarapí, 06.IV.1878, *B. Balansa 3337* (LPS 21528) (as *F. daedaloides* in Spegazzini, 1891).
Obs.: Spegazzini's type of *F. daedaloides* was studied by Rajchenberg & Wright (1987).

* **Stiptophyllum erubescens** (Berk.) Ryv., Norweg. J. Bot. 20: 4. 1973.
≡ *Daedalea erubescens* Berk., Ann. Nat. Hist. 4: 292. 1840.
ALTO PARANÁ, Reserva Biológica Itabó, Sendero Carayá, in tropical rain forest, 10.X.1990, *O. Popoff, G. Caballero et M. Gullón 902* (CTES). GUAIRÁ, Cordillera Ybytyruzú, 28.XII.1989, *F. Mereles 3719* (FCQ and CTES).

SPECIES DUBIAE

Favolus elegantissimus Spegazzini, Rev. Argent. Hist. Nat. 1: 107. 1891.
PARAGUARÍ, pr. Guarapí, aut. 1884, *B. Balansa 4283.*
Obs.: Holotypus not extant at LPS.

Favolus harioti Spegazzini, Rev. Argent. Hist. Nat. 1: 109. 1891.
= *Laschia harioti* (Spegazzini) Spegazzini, Bol. Acad. Nac. Ci. 23: 413. 1919.
PARAGUARÍ, pr. Guarapí, IV.1879, *B. Balansa w/n* (as *F. harioti* in Spegazzini, 1891), VI.1882, *B. Balansa 3228* (as *L. harioti* in Spegazzini, 1919).
Obs.: Holotypus not extant at LPS.

Favolus velutipes Fr., Nov. Symb. Mycol. 1: 104. 1851.
PARAGUARÍ, pr. Guarapí, V.1879, *B. Balansa 3338* (in Spegazzini, 1891).
Obs.: Fries's type of *F. velutipes* is lost.

Fomes loricatus Pers., Mycol. Europ. 2: 86. 1825.
CENTRAL, pr. Villa Morra and pr. Asunción, 1891-1893, *J. Anisits 79, 80, 189 and 387* (as *Ganoderma loricatum* in Spegazzini, 1919).
Obs.: Material of Anisits not extant at LPS.

Fomes orbiformis Fr., Epicr. Syst. Mycol, p. 463. 1838.
CENTRAL, pr. Asunción, 1893, *J. Anisits 447* (as *Ganoderma orbiforme* in Spegazzini, 1919).
Obs.: Anisits 447 not extant at LPS.

Polyporus formosissimus Spegazzini, Anales Soc. Ci. Argent. 16: 282. 1888.
PARAGUARÍ, pr. Paraguarí, 1880, *B. Balansa w/n* (Spegazzini, 1888).
Obs.: Holotypus not extant at LPS.

Polyporus hylocharis Spegazzini, Anales Soc. Ci. Argent. 16: 283. 1883.
PARAGUARÍ, pr. Guarapí, 1880, *B. Balansa w/n* (in Spegazzini, 1883).
Obs.: Holotypus not extant at LPS.

Polyporus lorentzianus Kalchbr., Fung. e Sib. & Am. Austr., p. 21. 1878.
PARAGUARÍ, pr. Guarapí, 1880, *B. Balansa w/n* (Spegazzini, 1883).
Obs.: Material of Balansa not extant at LPS.

Polyporus monachus Spegazzini, Anales Soc. Ci. Argent. 16: 281. 1883.
PARAGUARÍ, pr. Paraguarí, 1880, *B. Balansa w/n* (Spegazzini, 1883).
Obs.: Holotypus not extant at LPS.

Polyporus pachyotis Spegazzini, Anales Soc. Ci. Argent. 16: 283. 1883.
PARAGUARÍ, pr. Paraguarí, 1880, *B. Balansa w/n* (Spegazzini, 1883).
Obs.: Holotypus not extant at LPS.

Polyporus squamosus Huds.: Fr., Syst. Mycol. 1: 343. 1821.
SAN PEDRO, Antequera, VIII.1919, *W. Bertoni 1156* (Spegazzini, 1922).
Obs.: Bertoni 1156 not extant at LPS.

Polystictus decipiens Schw., Trans. Amer. Philos. Soc. (New Ser.) 4: 157. 1832.
CENTRAL, Villa Morra and Asunción, 1893, *J. Anisits 536* (Spegazzini, 1919).
Obs.: Anisits 536 not extant at LPS.

Poria superficialis Schw., Syn. Fung. Carol. p. 99. 1822.
CENTRAL, San Antonio, VII.1893, *C. Lindman 405 B* (Romell, 1901).
Obs.: The specimen at S as *Poria superficialis*, was collected by G. Malme without number, "Paraguay, San Antonio, Asunción, VIII.1893" and belongs to *Phellinus sp.*

Trametes fibrosa Fr., Epicr. Syst. Mycol. p. 490. 1838.
CENTRAL, Villa Morra and Asunción, 1893, *J. Anisits 317* (Spegazzini, 1919).
Obs.: Anisits 317 not extant at LPS.

NOMEN DUBIUM

Ceriomyces ferrugineus Spegazzini, Bol. Acad. Nac. Ci. 23: 406, 1919.
CENTRAL, pr. Trinidad, 1892, *J. Anisits 240* (Spegazzini, 1919).
Obs.: *Nomen anamorphosus.*

NOMINA INCERTA

We have unable to find the correct citations for the following records.
Chaetoporus jodinus Mont. (in Romell, 1901).
Ganoderma loricatum Pers. (in Spegazzini 1919).
Ganoderma ohiense Berk. (in Romell 1901).
Ganoderma orbiforme (Fr.), (in Spegazzini 1919).
Hexagona versicolor Fr. (in Spegazzini 1888).
Polyporus sclerodepsis Berk. (in Romell 1901).
Polyporus umbonatus Fr. (in Spegazzini 1883).

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NEW SPECIES AND RECORDS OF LACHNUM FROM TAIWAN

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Abstract: Ten new records of *Lachnum,* including one new combination and one new species are described and illustrated from Taiwan. The new species, *Lachnum taiwanense,* occurs on decayed stems of *Polygonum cuspidatum.* Other species recorded from Taiwan for the first time are *L. abnorme, L. attenuatum, L. brasiliense, L. calosporum, L. flavidulum, L. oncospermatum, L. pteridophyllum, L. pygmaeum* and *L. sclerotii. Lachnum oncospermatum* is proposed as a new combination for the previously reported *Dasyscyphus oncospermatis.*

Lachnum species have been studied in diverse regions of the world (Dennis 1954; Haines & Dumont, 1984; Raitviir, 1970; Spooner, 1987). They have been reported in Asia, from India (Singh, 1975; Sharma, 1983; 1986), Japan (Hosoya *et al*., 1991; Nagao and Doi, 1996; Nagao, 1996), Java (Penzig & Saccardo, 1904), Mainland China (Korf and Zhuang, 1985; Teng, 1996; Zhuang, 1989), but until now, only four species have been recorded from Taiwan (Liou & Chen, 1977; Wu, 1995). Sawada (1959) was first to study Helotiales (Leotiales) in Taiwan from 1919 to 1959, however no records of *Lachnum* were included. The present work, which is part of a larger study on the saprophytic ascomycetes of Taiwan, adds ten additional new records to the fungal flora of Taiwan. All of the specimens cited below are deposited at either herbarium (TMTC), The Department of Mathematics and Science Education of Taipei Municipal Teacher's College or at herbarium (TNM), National Museum of Natural Science, Taichung, Taiwan.

MATERIALS AND METHODS

Collections were made between January 1992 and April 1997, primarily from the mountain areas of Taiwan between 700 m and 1770 m elevation, but also from Lulinshan ca 2640 m elevation. Most samples were examined and photographed macroscopically while still fresh within 2 to 3 days of collection, after which they were dried at 40° C for 2-3 hrs. For microscopic examination fresh specimens were mounted in distilled water, lactophenol, lactophenol with cotton blue, Melzer's reagent or phloxine B, but dried specimens were wetted with 5% KOH beforehand. Measurements and photographs of ascospores, asci, paraphyses and hairs were taken from lactophenol-mounted material. Apothecial sections 8-10 µm thick were made with a Yamato Kohki "Electro Freeze" Model MC-802A microtome.

RESULTS AND DISCUSSION

1. ***Lachnum abnorme*** (Mont.) J. H. Haines & Dumont, Mycotaxon 19: 10. 1984.
≡ *Trichopeziza abnormis* (Mont.) Sacc., Syll. Fung. 8: 429. 1889.
≡ *Dasyscyphus abnormis* (Mont.) Dennis, Kew Bull. 17: 320. 1963.
For additional synonyms see Haines & Dumont (1984).

Apothecia 1-3 mm diam., scattered to crowded on decayed twigs of broad-leaved trees, superficial, short-stipitate, globose when young, opening to cupulate, and finally planate at maturity, covered externally with pale buff to white hairs at the margin and pale buff to brown hairs on the lower portion. Margin incurved and often irregular when dry. Hairs without resin-like formations at the tips. Disc yellow to orange. Stipe central, stout, cylindrical, clothed with hairs or glabrous and with a brown-black base. **Hairs** up to 180 μm long, mostly 88-128 x 3.2-4.8 μm, cylindrical or slightly tapered near the tip, obtuse, flexuous, multiseptate, forming cells 11-21 μm, with tightly adhering granules, hyaline to ochraceous with transmitted light. Subhymenium of interwoven septate hyphae. Medullary excipulum of *textura intricata* or *textura angularis*. Ectal excipulum of hyaline *textura prismatica*. **Asci** 60-104 x 5.0-9.0 μm (ave. =83.1 x 6.9 μm) clavate, with tapered base, conical apex, 8-spored, J+. **Ascospores** 47-58(-63) x 2.0-2.8 μm, cylindrical, tapered toward the distal end, usually slightly curved or flexuous, commonly 5-7-septate at maturity, guttulate, hyaline, thin-walled. **Paraphyses** 1.6-2.4 μm at the widest point, narrowly lanceolate, without septa, commonly exceeding the asci by ca. 15 μm, straight, unbranched, hyaline.

SPECIMENS EXAMINED: TAIWAN. Chiayi: Nanshi Forest Road, alt. 1750 m, on dead twigs, 3-V-1994, *Y. Z. Wang* WAN *028* (TNM F1916). Hsinchu: Sumakussushan, alt. 1600 m, 24-V-1994, *W. N. Chou* WAN *042* (TNM F2116). Ilan: Fushan Botanical Garden, alt. 750 m, on rotten twigs, 24-III-1994, *M. L. Wu 94-F2-II-T1* (TMTC); *94-F3-II-T4* (TMTC); 24-III-1996, *96-F3-II-T5* (TMTC); alt. 660 m, on rotten wood, 9-IX-1994, *Y. Z. Wang* WAN *006* (TNM F1781). Kaohsiung: Liukuei, alt. 750 m, 22-XII-1993, *Y. Z. Wang* (TNM F1449). Miaoli: Kuanwu, alt. 1900 m, on rotten wood, 18-VI-1996, *W. N. Chou* WAN *296* (TNM F4713). Nantou: Hoshe, alt. 750 m, on rotten wood, 2-V-1994, *S. Z. Chen* WAN *026* (TNM F1914). Hsitou, alt. 1200 m, on dead twigs, 14-IV-1994, *Y. Z. Wang* WAN *015* (TNM F1903). Meifeng, alt. 2100 m, on dead trunk of angiosperm, 12-IV-1995, *Y. Z. Wang* WAN *116* (TNM F3073). Pilu, alt. 2100 m, on rotten wood, 12-IV-1993, *Y. Z. Wang* (TNM F0569); 28-IV-1993, *S. T. Chiu 01773* (TNM F0778). Tungpu, alt. 1100 m, 19-V-1993, *J. M. Chen* (TNM F0772).

DISTRIBUTION: Previously reported from Argentina, Australia, Brazil, Bolivia, Colombia, Costa Rica, Ecuador, Guadeloupe, India, Jamaica, Japan, Java, Mainland China, Malaya, Mexico, New Guinea, New Zealand, Panama, Peru, Puerto Rico, Rwanda, Singapore, Taiwan, Venezuela.

DISCUSSION: *Lachnum abnorme* was previously reported from Taiwan from a single collection (Wu, 1995), but it has been discovered to be relatively common between 670 and 1750 m elevation. there. The host plants of *L. abnorme* are difficult to determine as the apothecia appear on detached and often decayed twigs and wood.

2. ***Lachnum attenuatum*** J. H. Haines & Dumont, Mycotaxon 19: 35. 1984. **Fig.1.**

Apothecia 0.5-1.0 mm diam., on dead twigs of broad-leaved trees, scattered to crowded on bark, appearing as a tuft of white hairs when young, becoming cup-shaped at maturity, covered with white hairs, sessile or short stipitate, not blackened at the base, firmly inserted in substrate. Disc orange, obscured by hairs when young. **Hairs** up to 126 µm, with tightly adhering granules. Ectal excipulum of hyaline *textura primastica*. Medullary excipulum of hyaline *textura intricata*. **Asci** (76-)84-104(-108) x 10-12 µm, clavate with tapered base, apex slightly conical, J+, 8-spored with spores clustered in upper half at maturity. **Ascospores** (28.4-)35-45(-47.3) x 1.6-3.2 µm, narrowly-clavate, straight or evenly curved, but not flexuous, with blunt apex and tapered base, with widest point about 1/3 back from apex, 3- or, more commonly, 5-septate, hyaline, thin-walled, without conspicuous lipid bodies. **Paraphyses** narrow, clavate-filiform, straight, unbranched above the base, 1.5-2.5 µm at the widest point, 1-3 septate, hyaline, thin-walled, without conspicuous contents or adhering particles.

SPECIMEN EXAMINED: TAIWAN. Nantou: Sunlinksea, alt. 1700 m, on dead twig, 19-VI-1993, *S. H. Wu 9306-31* (TNM F1117).

DISTRIBUTION: Brazil, India, Peru, Venezuela. First report from from Taiwan.

DISCUSSION: This species is distinguished from similar lignicolous lachnums by its clavate spores and small, almost sessile apothecia densely covered with white hairs. The Taiwan specimen has no distinct resinous material on the tips of the hairs and the ascospores are slightly smaller, but still within the size range recorded by Haines and Dumont (1984). This species is less common than the other wood inhabiting lachnums described in this paper.

3. ***Lachnum brasiliense*** (Mont.) J. H. Haines & Dumont, Mycotaxon 19: 23. 1984.
=*Peziza illota* Berk. & M. A. Curtis in Berk., J. Linn. Soc. Bot. 10: 368.1868.
For additional synonyms see Haines & Dumont (1984). **Fig 2.**

Apothecia 0.5-1.0 mm diam., superficial, scattered to crowded on unidentified, dead woody stems, globose, short-stipitate, covered with bright white hairs not capped with crystalline matter. Disc deep cup-shaped when young, planate at maturity, remaining flat in dried specimens, buff-yellow to orange-yellow. Stipe central, cylindrical, concolorous with cup, covered with hairs, often with blue-black base. **Hairs** up to 138 x 2.5-3.8 µm, hyaline, evenly cylindrical with hemispherical tips, septate, forming cells 9-17 µm long, externally roughened with small irregular-shaped, tightly-adhering granules. Ectal excipulum composed of hyaline, *textura prismatica*. Medullary excipulum of loosely interwoven, highly-branched, hyaline *textura intricata*. **Ascospores** (32-)42-50(-62) x (2.0-)3.2-3.5(-4.8) µm, fusiform, straight or curved, non-septate, hyaline. **Asci** (67.2-)88-104(-114) x (4.0-)4.8-6.4(-8.0) µm, cylindrical with a tapered base and rounded apex, J+. **Paraphyses** filiform, 1.6-2.4 µm at the widest point, unbranched, hyaline, thin-walled.

SPECIMENS EXAMINED: TAIWAN. Ilan: Fushan Botanical Garden, alt. 700 m, on dead twigs, 30-VIII-1994, *M. L. Wu 94-F7-II-T4* (TMTC). Taipingshan: alt. 2000 m, 18-

XI-1992, *S. H. Wu 9211-68* (TNM F0551). Chiayi: Nanshi Forest Road, alt. 1950 m, on dead twigs, 13-X-1993, *S. Z. Chen* (TNM F1305); alt. 2000 m, on rotten wood, 15-X-1994, *W. N. Chou* WAN *083* (TNM F2594). Kaohsiung: Liukuei, alt. 750 m, on rotten wood, 12-XII-1993, *S. Z. Chen* (TNM F1450). Miaoli: Mapihaohsi, alt. 1650 m, on rotten wood, 30-VIII-1995, *S. Y. Tseng* SY*14* (TNM F3697). Nantou: Hoshe, alt. 750 m, on dead wood, 8-VIII-1995, *W. N. Chou* WAN *181* (TNM F3452). Hsitou, alt. 1200 m, on rotten wood, 27-VII-1993, *S. H. Wu* (TNM F1002). Kuankao, alt. 2700 m, on dead twigs, 10-VIII-1995, *W. N. Chou* WAN *187* (TNM F3458). Lienhuachih, alt. 700 m, on dead twigs, 17-V-1994, *W. N. Chou* WAN *039* (TNM F2113); 8-VI-1995, *W. N. Chou* WAN *158* (TNM F3422); 20-V-1995, *W. N.Chou* WAN *142* (TNM F3165). Meifeng, alt. 2150 m, on branch of angiosperm, 9-XI-1995, *S. H. Wu 9511-42* (TNM F4079); on dead twigs, 16-XII-1992, *Y. Z. Wang 92145* (TNM F0407); Sunlinksea, alt. 1700 m, on twigs of *Alnus*, 2-VII-1992, *S. H. Wu 9266* (TNM F0234). Tsuifeng, alt. 2300 m, on dead twigs, *S. H. Wu*, (TNM); 16-II-1993, *W. N. Chou* (TNM F0559); 21-IX-1993, *S. H. Wu 9309-29* (TNM 1184); Yushan National Park, alt. 1600 m, on dead twigs, 6-X-1992, *S. H. Wu 92115* (TNM F0732). Taichung: Anmashan, alt. 2275 m, on rotten wood, 11-IX-1996, *W. N. Chou* WAN *332* (TNM F5163); on branch of angiosperm, 7-VI-1995, *S. H. Wu 9506-48* (TNM F3442); Husiun Forestry Station, alt. 1340 m, on dead twigs, 18-IX-1995, *S. Y. Tseng & C. A. Chiu* WAN *230* (TNM F3699); *231* (TNM F3700).

DISTRIBUTION: Argentina, Bolivia, Brazil, Ceylon, Colombia, Costa Rica, Cuba, Ecuador, Guadeloupe, Jamaica, Madagascar, Mainland China, Mexico, Panama, Peru, Rwanda, Puerto Rico, Tanzania, Venezuela. Reported here for the first time from Taiwan.

DISCUSSION: This is the most commonly collected *Lachnum* in Taiwan. The host plants are often difficult to identify because the fungus usually occurs on detached and decayed woody plant parts.

4. ***Lachnum calosporum*** (Pat. & Gaillard) Haines & Dumont, Mycotaxon 9: 21. 1984.
≡*Dasyscyphus calosporus* (Pat. & Gaill.) Dennis (as *Dasyscypha calospora*), Kew Bull. 9: 302. 1954.
For additional synonyms see Haines & Dumont (1984).

Apothecia 0.5-2 mm diam., scattered on dead twigs of broad leaved trees, nearly globose when young, finally becoming salviform with a fully exposed disc when mature, covered with buff-colored hairs which shade to nearly white at the margin, stipitate. Stipe short and often indistinct, devoid of hairs near the base. Disc buff to sienna, planate at maturity. **Hairs** up to 60 x 3.1-6.0 µm, hyaline to buff, cylindrical to clavate, septate, roughened with tightly adhering particles, thin to moderately thick-walled, sometimes with brown contents. Medullary and ectal exipulum similar to *Lachnum attenuatum*. **Asci** (104-)110-142(-148) x (9-)12-16(-19) µm, cylindric with a slightly tapered base and hemispherical apex with a distinct, apical, J+ pore, spores filling the entire ascus when mature, 8-spored. **Ascospores** (83-)107-110(-119) x (1.6-)2.0-3.0(-4.7) µm, cylindric-fusoid, with hemispherical apex and tapered base, straight or curved, up to 10-septate. **Paraphyses** narrowly lanceolate, 1.6-2.4 µm at the widest point, with blunt apices, exceeding the asci by 10-17 µm.

SPECIMENS EXAMINED: TAIWAN. Ilan: Fushan Botanical Garden, alt. 650 m, on dead twigs, 25-X-1994, *M. L. Wu 94-F9-II-T8* (TMTC).

DISTRIBUTION: Colombia, Cuba, Jamaica, Mexico, Venezuela. Reported here for the first time from Taiwan.

DISCUSSION: The Taiwanese example has slightly wider ascospores than those reported by Haines and Dumont (1984), and no microconidia were observed. Also unlike the neotropical collections previously recorded, the Taiwan example was from a relatively low elevation.

5. ***Lachnum flavidulum*** (Rehm) J. H. Haines in Korf & W. Y. Zhuang, Mycotaxon 22: 501. 1985. **Fig. 3.**

≡*Dasyscypha flavidula* Rehm, Ann. Mycol. 7: 542. 1909.
=*Dasyscypha varians* Rehm, *Hedwigia* 39: 94. 1900.
≡*Lachnum varians* (Rehm) Spooner, Helotiales of Australasia: Geoglossaceae, Orbiliaceae, Sclerotineaceae, Hyaloscyphaceae. J. Cramer. p.466. 1987 *non Lachnum varians* (Saut.) Rehm, Rabenh. Krypt.-Fl. ed. 2 (I) 3: 869. 1896.
=*Erinella citrina* P. Henn., Hedwigia 36: 233. 1897 *non. Lachnum citrinum* Velen., Monogr. Discom. Bohem. I, p. 246. 1932.
=*Lachnum gleicheniae* E. K. Cash, Mycologia 30: 105. 1938.
≡*Lachnella gleicheniae* (E. K. Cash) Seaver, N. Amer. Cup-fungi, inoperc. p. 266. 1951.

Apothecia 0.1-0.5 mm diam., growing singly or gregariously on dead petioles and rachi of tropical ferns, goblet-shaped, stipitate, disc yellow, covered with buff-yellow hairs bearing amber-colored resin masses when young with exposure the hairs turn grey-white and bear dark red resin deposits. **Hairs** to 88.0 x 2.4-3.2 μm, septate, cylindrical, roughened with minute, elongated, tightly-adhering, water insoluable granules. Resin masses often adhering several hairs together, amber- to garnet-colored and water-soluable. Ectal excipulum of *textura prismatica*. Medullary excipulum of *textura intricata.* **Asci** (25-)31-41(-48) x (2.5-)4.7-5.7(-7.7) μm, clavate-cylindric, J+. **Ascospores** (5.0-)7.8-9.5 x 1.3-2.0 μm, fusiform to ellipsoidal with rounded tips, non-septate, irregularly biseriate. **Paraphyses** 1.3 -2.0 μm at the widest point, narrowly lanceolate, hyaline, non-septate, slightly longer than the asci.

SPECIMENS EXAMINED: TAIWAN. Ilan: Fushan Botanical Garden, alt. 600 m, on *Gymnosphaerea podophylla*, 23-I-1995, *M. L. Wu 95-F1-II-P3* (TMTC); 22-II-1995, 95-F2-II- P1 (TMTC);*); 97-F2-II-P6* (TMTC); 21-IV-1994, *W. N. Chou* WAN *019* (TNM F1907); 30-V-1995, *W. N. Chou* WAN *149* (TNM F3413). Nantou: Hsitou, alt. 1200 m, on tree ferns, 18-VI-1993, *S. H. Wu 930617* (TNM F1116). Taichung: Anmashan, alt. 2275 m, on tree fern, 3-V-1995, *Y. Z. Wang* WAN *133* (TNM F3090).

HOSTS: In Taiwan this species is found on petioles and rachi of tree ferns including *Gymnospharea podophylla* (Hook.) Copel. and other members of the family Cyatheaceae.

DISTRIBUTION: Australia, Brazil, Colombia, Ecuador, Hawaii, Japan, Mexico, New Zealand, Panama, Papua New Guinea, Puerto Rico, Taiwan, Venezuela.

DISCUSSION: This species has been known as *Dasyscyphus varians,* but when that name was transfered to *Lachnum* by Spooner (1987) a later homonym was created. The next earliest epithet, *Erinella citrina* P. Henn., is also preoccupied in *Lachnum.* The first available epithet in *Lachnum* is *flavidulum.*. This nomenclatural history is unfortunate in view of the fact that this is one of the most widely collected tropical discomycetes. The difficulty in recognizing this species lies with its propensity to change color when its water soluble pigment migrates to the tips of its hairs to form resin-like lumps. Apothecea may have yellow or white hairs and may have resinous masses ranging from buff to garnet color. These variations may occur in the same collection. The species was previously reported from Taiwan by Wu (1995). It is distinguished from two related fern-inhabiting species, *L. pteridphyllum* and *L. oncospermatum* by its small, elliptical ascospores. Intermediate spore types and sizes are known.

6. ***Lachnum oncospermatum*** (Berk. & Broome) M. L. Wu & J. H. Haines ***comb. nov.***
Figs 4-6.

Basionym: *Peziza oncospermatis* Berk.& Broome, J. Linn. Soc., Bot. 14: 105. 1875.
≡*Dasyscypha oncospermatis* (Berk. & Broome) Sacc., Syll. Fung. 8: 465. 1889.
≡*Atractobolus oncospermatis* (Berk. & Broome) Kuntze, Revis. Gen. Pl. 3(2): 446. 1898.
≡*Aranea oncospermatis* (Berk. & Broome) Petch, Ann. Roy. Bot. Gard. Peradiniya 6: 164. 1917.

Apothecia 0.25-0.4 mm diam., scattered to gregarious on the dead rachi and petioles of Cyatheaceae, often spreading over large areas, superficial, infundibuliform, compound, lobed, or with convoluted margins, covered with buff-yellow hairs capped with lumps of orange-red to garnet-red resinous-appearing matter, distinctly stipitate. Disc yellow-orange, concealed by hairs when dry. Stipe solitary or with as many as seven cups on a single stipe, similarly covered with buff-yellow hairs. **Hairs** up to 72 x 2.5-3.8 μm, light brown to orange-yellow, cylindrical with hemispherical tips and slightly tapered bases, thick-walled, multiseptate, forming cells 8-22 μm long, roughened with granules. Ectal excipulum hyaline, composed of *textura prismatica*. **Asci** (76-)88-96 x (4-)6-8(-12) μm, clavate, J+, 8-spored. **Ascospores** (24-)27-39(-42) x 2.0-3.2 μm, fusiform with pointed tips, hyaline, often biguttulate, non-septate, biseriate in the ascus. **Paraphyses** 1.3-2.0 μm at the widest point, filiform, slender, often branched in the lower portion, hyaline, not extending beyond the asci in the hymenium.

SPECIMENS EXAMINED: TAIWAN. Ilan: Fushan Botanical Garden, alt. 500-900 m, on *Gymnospharea podophylla* and *Histiopteris incisa,* 26-V-1994, *M. L. Wu 94-F4-II-P1* (TMTC); 26-VI-1994, *94-F5-II-P1* (TMTC); 23-II-1995, 95-F2-II-P1 (TMTC); 29-V-1995, 95-F5-II-P4 (TMTC); 27-VI-1996, 96-F6-II-P2 (TMTC); 96-F6-II-P3 (TMTC); 27-

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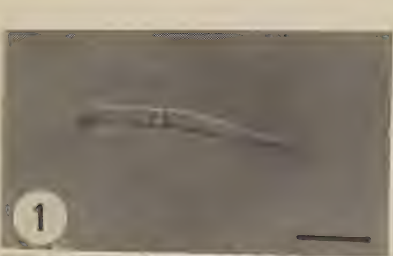
Fig. 1- 6. *Lachnum attenuatum, Lachnum brasiliense, Lachnum flavidulum* and *Lachnum oncospermatum.* **Fig. 1.** Ascospore of *L. attenuatum.* Bar = 11.5 μm. **Fig. 2.** Asci, ascospores, paraphyses and subhymenium of *L. brasiliense*. Bar = 12.5 μm. **Fig.3**. Hymenium of *L. flavidulum.* Bar = 13.1 μm. **Fig. 4.** Asci and hairs of *L. oncospermatum.* Bar = 10.3 μm. **Fig. 5.** Ascus of *L. oncospermatum*. Bar = 12.3 μm. **Fig. 6.** Ascospore of *L. oncospermatum*. Bar = 11.4 μm.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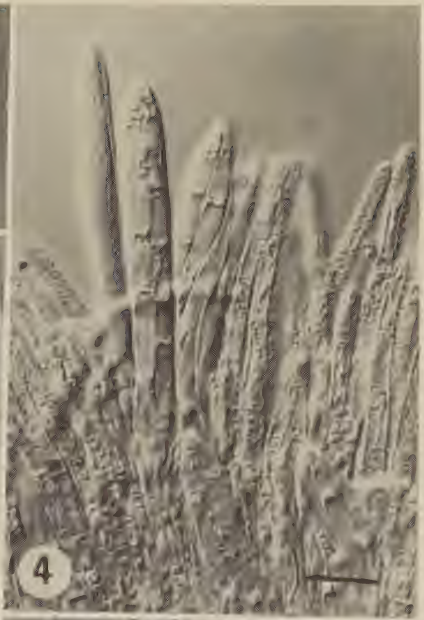
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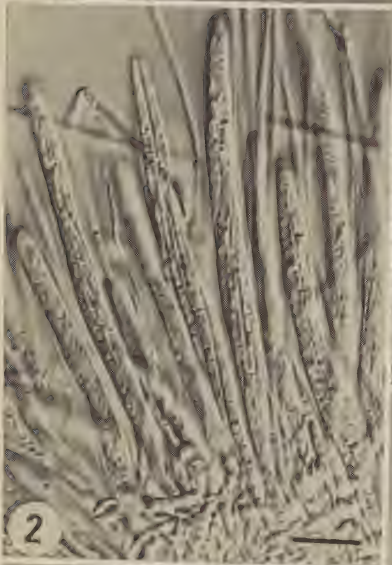
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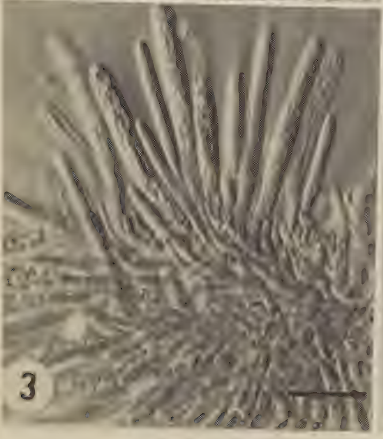
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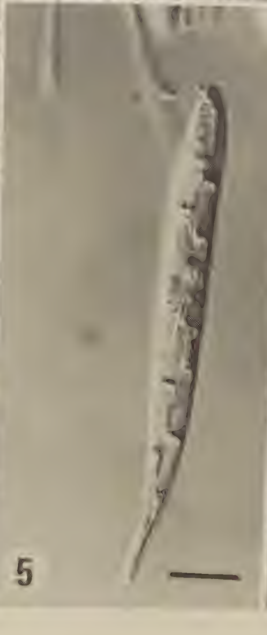
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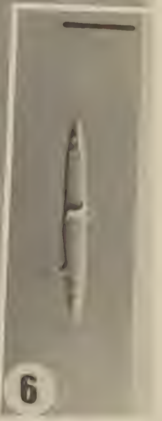
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IV-1997, 97-F2-II-P1 (TMTC); 97-F2-II-P4 (TMTC); alt. 660 m, on *G. podophylla, Chou* WAN *147* (TNM F3412). Nantou: Huisum Forestry Station, on tree fern, 2-XI-1996, *W. N. Chou* WAN *341* (TNM F5308).

HOSTS: Two new hosts, the tree fern, *Gymnosphaera podophylla* and the smaller fern, *Histiopteris incisa* are reported here for the first time.

DISTRIBUTION: Australia, Ceylon, Java, Philippine Islands. Reported here for the first time under the current name from Taiwan.

DISCUSSION: This species was previously reported from Taiwan by Wu (1995) under the name *Dasyscyphus oncospermatis.* It is distinquished from related species on tropical ferns by the branched stipe, convoluted disc margin and spores with pointed tips. Haines (1980) previously treated *Dasyscyphus lanariceps* [=*Lachnum lanariceps* (Cooke & Phillips) Spooner] as a synonym of *Dasyscyphus oncospermatis,* but as pointed out by Spooner (1987). This may have been a hasty decision. *Lachnum lanariceps* can be distinquished from the present species on the basis of having simple rather than compound apothecia and shorter spores, (17-)18-28(-31).Two additional synonyms are given here for *Lachnum lanariceps* (Cooke & Phillips) Spooner:
=*Dasyscypha javanica* Penzig & Sacc., *Malpighia* 15: 209. 1902.
=*Dasyscypa cyatheae* Rehm, Leafl. Philipp. Bot. 6: 2280. 1914.

7. ***Lachnum pteridophyllum*** (Rodway) Spooner, Helotiales of Australasia: Geoglossaeceae, Orbiliaceae, Sclerotineaceae, Hyaloscyphaceae. J. Cramer. p.470. 1987. **Fig 7.**

≡*Dasyscypha pteridophylla* Rodway Pap. and Proc. Roy. Soc. Tasmania 1920: 158. 1921.
≡*Dasyscyphus varians* var. *pteridophylla* J. H. Haines, Mycotaxon 11, 209. 1980.
≡*Lachnum varians* var. *pteridophyllum* (Rodw.) M. P. Sharma, Nova Hedwigia 43: 411. 1968.

Apothecia minute, 0.2-0.8 mm diam., growing singly or gregariously on dead petioles or rachi of ferns, cup-shaped, stipitate, densely clothed with yellow, buff, or white hairs bearing amber colored particles. Disc yellow, usually covered by cup margin in dry specimens. Stipe 0.2-0.5 mm long, also densely covered with hairs. **Hairs** to 64 x 1.9-2.5 μm, septate, pale buff-yellow with transmitted light, cylindrical, thin-walled, roughened with tightly adhering granules. Ectal and medullary excipula are similar to that of *L. flavidulum*. **Asci** (37-)48-54 x 4.4-5.4 μm, cylindrical, with a narrowed base, J+. **Ascospores** (9-)12-14(-16.0) x 1.8-2.0 μm, fusiform, both ends narrowed to sharp points, nonseptate but often containing a row of guttules. **Paraphyses** lanceolate, with blunt apices, 1.3-2.2 μm at the widest part, exceeding the asci by up to 10 μm in the hymenium.

SPECIMENS EXAMINED: TAIWAN. Ilan: Fushan Botanical Garden, alt. 500-900 m, on *Gymnospharea podophylla* and *Histiopteris incisa,* 23-I-1995, *M. L. Wu 95-F1-II-P1 (TMTC); 95-F1-II-P4 (TMTC); 26-IV-1995, 95-F4-II-P3 (TMTC); 95-F4-II-P4 (TMTC);* 27-VII-1995, *95-F7-II-P1 (TMTC);* 15-II-1995, *96-F2-II-P1 (TMTC);* 27-VI-1996, *96-F6-II-P1 (TMTC);* 27-IV-1997, *97-F2-II-P4 (TMTC); 97-F2-II-P5 (TMTC); 97-F2-II-P6*

(TMTC); alt. 660 m, on tree fern, 24-XI-1994, *Y. Z. Wang* WAN *097* (TNM F2707); 26-IV-1995, *W. N. Chou* WAN *126* (TNM F3083); 30-V-1995, WAN *146* (TNM F3411); Yuanyanghu, alt. 1770 m, on tree fern, 15-VI-1995, *Y. Z. Wang* WAN *168* (TNM F3431); Nantou: Lienhuachih, alt. 700 m, on tree fern, 4-V-1995, *Y. Z. Wang* WAN *137* (TNM F3094); 20-V-1995, WAN *143* (TNM F3166).

HOSTS: Two new fern hosts are recorded here, *Gymnospharea podophylla* (Hook) Copel and *Histiopteris incisa* (Thumb.) J. Sm.

DISTRIBUTION: Australia, Colombia, Jamaica, Japan, Mexico, New Zealand, Papua New Guinea, Panama, Peru, Puerto Rico, Tasmania, Venezuela. Reported here for the first time from Taiwan.

DISCUSSION: This species is common in Taiwan on the above mentioned hosts and perhaps other ferns. *L. pteridophyllum* is indistinquisheable from *L. flavidulum* macroscopically but is separated from the latter by its longer, bipolar, fusiform spores with pointed apices.

8. ***Lachnum pygmaeum*** (Fries) Bres., Ann. Mycol. 1: 121. 1903. **Fig 8.**
For synonyms see White (1942).

Apothecia up to 2 mm diam., cup-shaped at first, becoming peltate at maturity and with inrolled margin when dry, clothed with short, white hairs, long stipitate. Stipe up to 5 mm long, 0.5-1.0 mm in diam, tapered toward the base, sparsely covered with white hairs. Disc plano-concave, yellow when fresh, becoming orange to brown when dry. **Hairs** up to 62 x 3.1-4.7 µm, hyaline, cylindrical, obtuse, thin-walled, septate, roughened with tightly adhering granules. Subhymenium not clearly differentiated. Medullary excipulum of hyaline *textura porrecta* adjacent to the ectal layer. **Asci** 61-71 x 4.6-6.3 µm, 8-spored, narrowly cylindric-clavate, apex conical, J+ with long slender stalk. **Ascospores** 5.6-6.8(-11) x 1.6-2.0 µm, hyaline, narrowly fusiform, often inequilateral or slightly curved, biseriate or obliquely uniseriate. **Paraphyses** hyaline, lanceolate, septate, exceeding the asci by 10-20 µm.

SPECIMENS EXAMINED: TAIWAN. Kaohsiung: Liukuei, alt. 750 m, on seed coat, 22-XII-1993, *Y. Z. Wang* (TNM F1447).

DISTRIBUTION: Widely distributed in Europe and North America. It has also been reported from Australia, India, and Mainland China. It is reported here for the first time from Taiwan.

DISCUSSION: This is a widely distributed fungus, but it is never plentiful.

9. ***Lachnum sclerotii*** (A. L. Sm.) J. H. Haines & Dumont, *Mycotaxon* 19:17-21. 1984..
=*Dasyscyphus subcorticalis* (Pat.) Dennis (as *Dasyscypha subcorticalis)* Kew Bull. 9:299. 1954. **Fig. 9**
For additional synonyms see Haines & Dumont (1984).

Apothecia 0.5-1.5 mm diam., scattered on the dead wood, nearly globose when young, opening to goblet-shaped, and finally shallow cup-shaped with a raised, even, circular margin at maturity, pale buff, covered externally with buff to ochraceous hairs with white- to amber-colored resin at the tips, stipitate. Stipe cylindrical, less than 0.5 mm high, usually visible in unexpanded apothecia, but covered by the upper portion of the cup when expanded, usually darkened at the base. **Hairs**, up to 80 X2.5-3.8(-5.0) µm, cylindrical with hemispherical tips covered with resinous-appearing masses which dissolve in aqueous solution, thin-walled, hyaline, septate, roughened externally with tightly adhering granules. Ectal excipulum similar to that described for *Lachnum abnorme*. **Asci** (65-)72-80(-88) x 5-7(-9) µm, cylindrical with a tapered base and hemispherical apex, J+. **Ascospores** (15-)19-25(-28) x 1.6-2.4 µm, fusiform, straight, tapered at each end, bipolar or nearly so, 3 septate, hyaline, thin-walled. **Paraphyses** 1.6-2.4 µm at widest point, narrowly, lanceolate with blunt apices, exceeding the asci by up to 12 µm, straight, unbranched, hyaline, thin-walled and non-septate in the upper half.

SPECIMENS EXAMINED: TAIWAN. Hualien: Tailuko, alt. 60 m, on dead wood, 8-XI-1995, *W. N. Chou* WAN *251* (TNM F4067); Ilan, Taoshan, alt. 2150 m, on rotten wood, 4-XI-1993, *S. T. Chiu 1937* (TNM F1431); Nantou: Hsitou, alt. 1200 m, 4-XI-1993, *Y. Z. Wang* (TNM); Sunlinksea, alt. 1600 m, on dead twigs, 19-IX-1992, *S. H. Wu 92108* (TNM F0336); Wushe, alt. 870 m, 4-VII-1996, *W. N. Chou* WAN *313* (TNM F5138).

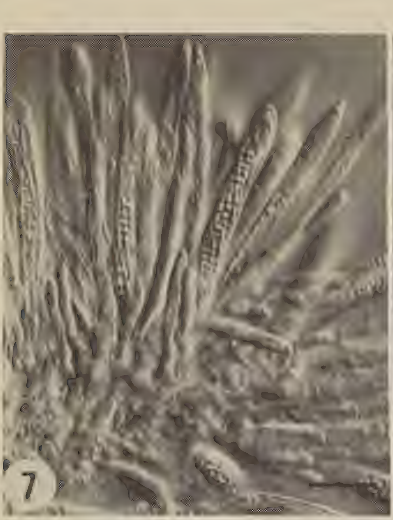
HOSTS: Twigs and wood of dicotyledonous trees. Seldom identified because they are usually detached and partly decayed.

DISTRIBUTION: Australia, Brazil, Colombia, Cuba, Dominica, Ecuador, Florida, Guadeloupe, India, Jamaica, Japan, Martinique, New Zealand, Panama, Papua New Guinea, Peru, Puerto Rico, Venezuela. New to Taiwan.

DISCUSSION: *Lachnum sclerotii* is widespread throughout tropical regions, however in Taiwan it is less common than the similar *L. abnorme and* has been found in only a few locations in southern Taiwan. It can be distinguished from *L. abnorme* in the field by the presence of amber-colored resin masses on the hair tips (Haines, 1992) and microscopically by its distinctive three-septate spores. No difference in elevational preferences between the two species were evident from the Taiwan collections.

10. ***Lachnum taiwanense*** J. H. Haines, M. L. Wu & Y. Z. Wang **spec. nov**. **Figs. 10-12.** *Apothecia dispersa, brevissime stipitata, cupulata vel infundibuliforme, 0.25-0.5 mm diametro, albotomentosa, hymenio luteolo. Pili ad 120 x 3-4 µm, tenuitunicati vel crassitunicati, cylindrici, granulati, hyalini, septati, ad apices pallidores subincrassati,*

Fig. 7-12. *Lachnum pteridophyllum, Lachnum pygmaeum, Lachnum sclerotii and Lachnum taiwanense.* **Fig. 7.** Asci with ascospores of *L. pteridophyllum*. Bar = 9.7 µm. **Fig. 8.** Asci and ascospores of *L. pygmaeum*. Bar = 2.7 µm. **Fig. 9.** Ascus with ascospores of *L. sclerotii.* Bar = 9.5 µm. **Fig. 10.** Ectal exciple and hairs of *L. taiwanense* Bar = 13.1 µm. **Fig. 11.** Hymenium and medullary excipulum of *L. taiwanense*. Bar = 13.7 µm. **Fig. 12.** Paraphysis, ascus and ascospores of *L. taiwanense*. Bar =14 µm.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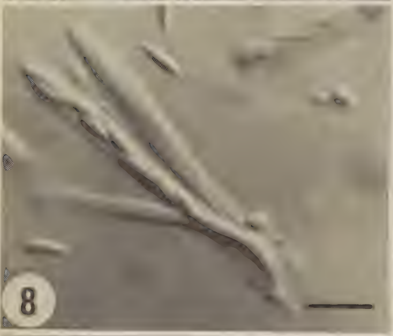
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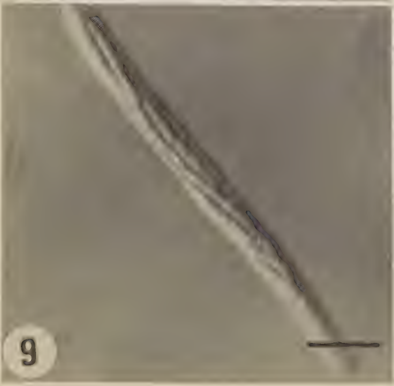
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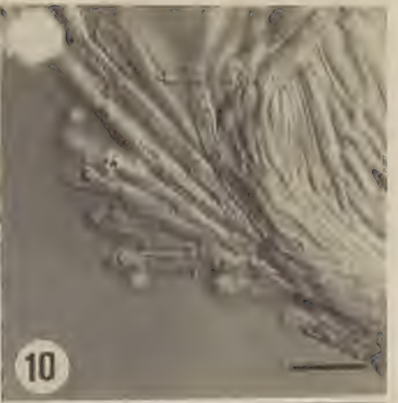
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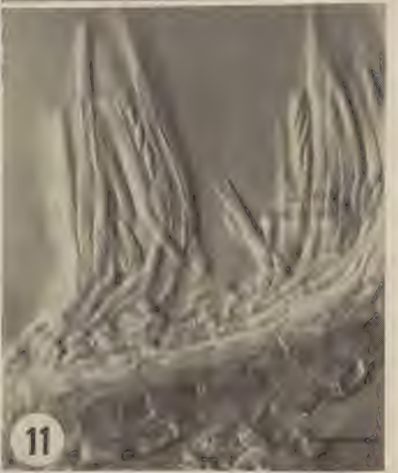
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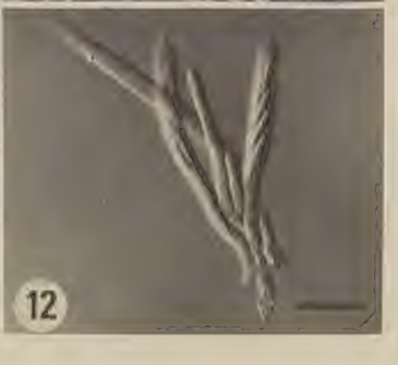
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crystalligeri. Asci 28-32(-59) x 2.8-3.8(-5) µm, cylindrici cum hemisphaericus apex. Ascosporae 5-9 x 1.0-1.4 µm, apice tornatae, basi attenuatae. Paraphyses lanceolati, ascos superantes 15-25 µm. Ad caules Polygonum cuspidatum Siebold & Zucconi emortuarum.
Holotypus: REPUBLIC OF CHINA, Taiwan, Nantou: Lulinshan, alt. 2650 m, 13-VI-1996, *S. Z. Chen* WAN 294 (TNM).

Apothecia scattered on stems of host, cup-shaped to funnel-shaped, 0.25-0.5 mm diam., covered with bright, white hairs, tipped with a abundant crystaline masses, stipitate. Disc yellow, exposed when moist, or covered by the inrolled margin and hairs when dry. Stipe stout, buff-yellow, glabrous, central, equal to or longer than the diameter of the disc. **Hairs** up to 100 x 3-4 µm, irregularly cylindrical, straight, septate, hyaline, thick- or thin-walled, fine granulate, capped or interspersed with crystalline masses up to 12 µm across. Crystals not dissolving in 3% KOH or lactophenol. Subhymenium of interwoven hyphae. Ectal excipulum of light yellow, slightly thick-walled *textura prismatica*. **Asci** (28-)37-47(-59) x (2.5-)2.8-3.8(-5.0) µm, cylindrical with hemispherical apex and slightly tapered base. **Ascospores** (4.8-)5.0-6.4(-9.0) x (0.8-)1.0-1.4(-1.9) µm, enlarged and rounded at the apex, tapered and pointed at the base, non-septate, straight. **Paraphyses** lanceolate with acute apices, unbranched, hyaline, 2.5-4.0 µm at the widest point, exceeding the asci by 15-25 µm in the hymenium.

HOSTS: On stems of the dicotyledonous plant *Polygonum cuspidatum* Sieb. & Zucc., "Japanese bamboo" (Polygonaceae).

DISTRIBUTION: So far known only from Taiwan.

DISCUSSION: This species is described here as new to science. Its name derives from the locality of its only known collection. Its combination of short spores enlarged at one end and thick- and thin-walled, hyaline hairs with crystalline masses is not found elsewhere in *Lachnum.* It bears a resemblance to the species of *Lachnum* in subgenus *Capitotricha* (Raitv.) Raitv. (=*Dasyscypha* Section *Bicolores* Dennis)., such as *L. capitatum* (Peck ex Thumen) Svrcek and *D. sinegoricus* Raitv., but the hairs of *L. taiwanense* are narrower and less consistantly thick-walled. The *Polygonum* host is very widespread as a weed and it is possible that this saprophytic *Lachnum* will be found in other regions.

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We are indebted to Dr. W. Y. Zhuang from the Institute of Microbiology, Academia Sinica, Beijing and Dr. Pavel Lizon of Cornell University for reviewing the manuscript, and we thank Dr. Richard Korf for additional suggestions. We thank Drs. T. Y. Hosoya and H. Nagao for making available their work on *Lachnum*, Miss C. M. Chou from Taipei Municipal Teachers College, for assisting in sectioning materials for photographs, and Lorinda Leonardi for help with the manuscript. We also wish to thank all the people who collected and donated specimens for this study. This study was supported by National Science Council to the senior author in the grant of NSC 84-2311-B-133-001.

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SARCOSOMATACEOUS DISCOMYCETES IN CHINA*

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ABSTRACT Available Chinese collections of the Sarcosomataceae were examined. Eleven species are recognized. *Plectania yunnanensis* is described as a new species. *Galiella oblongispora* is transferred to *Wolfina* and *Urnula helvelloides* to *Neournula*.

The family Sarcosomataceae contains a group of suboperculate discomycetes which possess dark apothecia, gelatinous tissues of varying degree, different shapes of ascospores which are either ornamented or smooth-walled, and usually anastomosing paraphyses. Nine genera are accepted here, *i.e. Chorioactis* Kupfer, *Desmazierella* Lib., *Galiella* Nannf. & Korf, *Korfiella* Pant & Tewari, *Neournula* Paden & Tylutki, *Plectania* Fuckel, *Sarcosoma* Casp., *Urnula* Fr., and *Wolfina* Seaver (Eckblad, 1968; Korf, 1972, 1973; Dennis, 1978; Paden, 1984; Cabello, 1988). But relationships among *Plectania*, *Galiella* and *Sarcosoma* need further study. Early Chinese records of the family are summarized by Teng (1963, 1996) in which species of *Pseudoplectania* Fuckel, *Sarcosoma*, and *Urnula* were included. As a basis for our study on Fungus Flora of the Chinese Sarcosomataceae, specimens on deposit in the Herbarium Mycologicum Instituti Microbiologici Academiae Sinicae (HMAS) and Herbarium of Cryptogams, Kunming Institute of Botany, Academia Sinica (HKAS) were scanned. Two collections were from the Herbarium of Xizang Institute of Ecology (HXZE). Eleven species of *Galiella*, *Neournula*, *Plectania*, *Urnula*, and *Wolfina* are recognized. *Plectania yunnanensis* is described as a new species, *Galiella oblongispora* J. Z. Cao is transferred to *Wolfina* and *Urnula helvelloides* Donadini, Berthet & Astier to *Neournula* which is also a new record to China. Name changes for five previously reported species are indicated.

GALIELLA Nannf. & Korf

Galliella includes suboperculate discomycetes which have gelatinous excipular tissues, hairs tangled on receptacle surface, and ascospores with cyanophilous warts. The genus was noted by Korf (1972) as having 15 species, by Cabello (1988) as 8, and

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by Hawksworth *et al.* (1995) as 4. A monographic revision of the genus is needed. Chinese species of *Galiella* were previously placed in *Sarcosoma* (Teng, 1963, 1996) which should have smooth-walled ascospores according to the current generic concept (Korf, 1957, 1972; Eckblad, 1968; Dennis, 1978; Paden, 1984) until the treatment by Cao *et al.* (1992). Three *Galliella* species are known in China.

Boedijn (1959) merged *Galiella* with *Sarcosoma*. We recognized two genera until the family is thoroughly studied and strong evidences found.

Galiella amurensis (Lj. N. Vassiljeva) Raitv., Izv. Akad. Nauk. Estonsk. SSR, Biol. 14(4): 531, 1965.

≡ *Sarcosoma amurense* Lj. N. Vassiljeva, Notul. Syst. Sect. Crypt. Inst. Bot. Acad. Sci. URSS 6: 188, 1950.

Specimens examined: **Heilongjiang**: on rotten wood, Liangshui, Dailing, T. J. Guo, VIII 1963, HMAS 33928; **Jilin**: on rotten twig, Baishan Forest Station, Antu, Y. C. Yang *et al.* 403, 25 VII 1960, HMAS 29555; on wood, Baishan Forest Station, Antu, Y. C. Yang *et al.* 448, 7 VII 1960, HMAS 29556; on rotten wood, Antu, Y. C. Yang, J. R, Yuan *et al.* 247, 17 VII 1960, HMAS 29557; on rotten wood, Changbai Mountain, Antu, Y. C. Yang *et al.* 551, 2 VIII 1960, HMAS 29558; on rotten twig, Changbai Mountain, Antu, Y. C. Yang *et al.* 504, 1 VIII 1960, HMAS 29559; on rotten wood of pine, Baishan Forest Station, Antu, Y. C. Yang *et al.* 246, 17 VII 1960, HMAS 29560; on twig, Changbai Mountain, Antu, Y. C. Yang *et al.* 503, 1 VIII 1960, HMAS 29561; on rotten wood of pine, Baishan Forest Station, Antu, Y. C. Yang *et al.* 249, 17 VII 1960, HMAS 29562; on twig, Changbai Mountain, Antu, Y. C. Yang *et al.* 589, 5 VIII 1960, HMAS 29563; on *Picea*, Hot Spring, Changbai Mountain, Y. L. Zhou, 17 VIII 1954, HMAS 33645; on rotten wood, Changbai Mountain, Antu, L. Ryvarden *et al.* 21673, IX 1983, HMAS 56653; on fallen wood, Changbaishan, Y. C. Dai 2361, 11 VIII 1997, HMAS 72167; **Xizang**: on wood, Baga, Milin, alt. 3200m, M. Zang 468-2, 30 XI 1978, HKAS 5468; *ibid.* M. Zang 476, 30 XI 1978, HKAS 5476.

This is a common species in China. Apothecia of most collections from Jilin possess an obvious light-colored margin. Most collections are from the northeast of China, whereas two are from Milin, Xizang (Tibet).

Compared with the Russian material (Raitviir, 1965), the Chinese fungus has wider ascospores (26-37.5 x 12-18 µm vs. 37-40 x 13-15 µm) and larger apothecia which are up to 6 cm in diam when dry.

Galiella celebica (Henn. in Warb.) Nannf. in Korf, Mycologia 49: 108, 1957.

= *Galiella sinensis* J. Z. Cao, Mycologia 84: 262, 1992.

Specimens examined: **Fujian**: on rotten wood, Qingning, alt. 600m, Q. Z. Wang 550, 2 VII 1960, HMAS 29566; **Yunnan**: on rotten wood, Jiangcheng, P. G. Liu 892, 7 VIII 1991, HKAS 23663.

Two Chinese collections fit the original description of *Galiella celebica* (Hennings, 1900) but differ, in some ways, from Le Gal's description (1953) which gave a wide range of spore size (23-27 x 11-13 µm by Hennings and 26.5-44 x 11-17 µm by Le Gal) and illustrated the roughened, short hairs in addition to smooth-walled, long ones. Hairs in our material are uniformly smooth-walled. This seems a small-spored species in the genus *Galiella*.

Galiella sinensis was established based on the specimen from Fujian Province (HMAS 29566) (Cao *et al.*, 1992) which was labeled under and very possibly reported as *Sarcosoma turbinatum* Wakef. (Teng, 1963). We found that it is identical with the original description of *G. celebica* and thus treat *G. sinensis* as a later synonym. HKAS 23663 has slightly larger ascospores (27-31 x 12-14 µm) than reported by Hennings (1900). Apothecia of another Yunnan collection has a thinner hymenium (250-265 µm thick) and wider ascospores (23-28 x 12.7-16.5 µm), which we marked as *G.* cf. *celebica* (on wood, Mok-kiang, Y. Tsiang 429, 1 VI 1934, HMAS 56519).

Galiella javanica (Rehm in Henn.) Nannf. & Korf, Mycologia 49: 108, 1957.
≡ *Sarcosoma javanicum* Rehm, Hedwigia 32: 226, 1893.

Specimens examined: **Anhui**: on rotten wood of broadleaf forest, Huangshan, S. C. Teng 5130, 30 VIII 1957, HMAS 23855; **Gansu**: on rotten wood, Tianshui, Y. C. Yang 539, 8 VIII 1958, HMAS 27738; **Guizhou**: on rotten wood, Libo, alt. 800m, X. L. Wu, 1 VIII 1986, HKAS 18206; on rotten wood, Maolan Preserve, Libo, Y. Li & Y. C. Zong 548, 1 VIII 1988, HMAS 57793; on rotten wood, Fanjingshan, Jiangkou, alt. 700m, M. Zang, 1 VII 1988, HKAS 20830, HMAS 71997; **Hainan**: on rotten wood, Nada, J. H. Yu & R. Liu, 19 V 1960, HMAS 29564; on rotten wood, X. K. Deng, 8 XI 1934, HMAS 56524; **Shaanxi**: on rotten wood, Fuping, J. Y. Zhuang & W. Y. Zhuang 876, 26 IX 1991, HMAS 69613; **Yunnan**: on rotten wood, Gaoligongshan, M. Zang, HKAS 4004; on rotten wood, Xichou, alt. 1900m, Q. Z. Wang, 11 V 1959, HMAS 27511; on rotten wood, Xichou, Q. Z. Wang 99, 15 V 1959, HMAS 27739; on rotten wood, Xichou, Q. Z. Wang 47, 13 V 1959, HMAS 27740; on rotten wood, Maguan, alt. 1950m, P. G. Liu 1224, HKAS 26048, HMAS 71998. **Guangxi**: on rotten twig, Napo, S. X. Sun, S. Y. Guo & W. Y. Zhuang 2376, 10 I 1998, HMAS 72177.

This species is easily separated from the others of the genus by its spore size and hairs which are granulate throughout or smooth in the upper portion and warted in lower part. The dark brown and thick-walled hairs are always warted. It occurs in the southern China and was formerly placed in *Sarcosoma* (Teng, 1963, 1996). Ascospores of most collections are 25-37 x 10.5-15.0 µm, but those of HMAS 56524 from Hainan are larger (33-41 x 13-17 µm).

NEOURNULA Paden & Tylutki

Judging from the original description and illustrations (Paden & Tylutki, 1969), *Neournula* differs from *Urnula* mainly in the presence of spore markings. The genus is generally accepted by many authors and was not reported previously in China. Until now it has been a monotypic genus (Paden, 1972; Hawksworth *et al.*, 1995).

Neournula helvelloides (Donadini, Berthet & Astier) W. Y. Zhuang, **comb. nov.**
Basionym: *Urnula helvelloides* Donadini, Berthet & Astier, Extr. Bull. Men. Soc. Linn. Lyon 42(3): 40, 1973.

≡ *Plectania helvelloides* (Donadini *et al.*) Donadini, Mycol. Helvet. 2: 228, 1987.

≡ *Donadinia helvelloides* (Donadini *et al.*) Bellem. & Mel.-Howell, Crypt. Mycol. 11: 218, 1990.

Specimen examined: **Xizang**: on ?soil with twigs, Juemushan, Linzhi, alt. 3120m, A. S. Xu 97031, 12 VII 1997, HXZE 1145, HMAS 72022.

Ascospores of the Xizang collection are ellipsoid with slightly narrow ends, 20-25 x 10.5-12.0 µm, and smooth-walled when it was just mounted in cotton blue. But spore markings were clearly detected in the same mount two months later, which are very low and give a smooth impression. A cyanophilous sheath surrounds the spore surface. The fungus has two types of paraphyses. The so-called hymenial hairs are cylindrical, non-septate, up to 4 µm wide and ordinary paraphyses are filiform, septate, 2 µm wide. The fungus is identical with *Urnula helvelloides* described by Donadini *et al.* (1973) which was later transferred to *Plectania* as *Plectania helvelloides* (Donadini, Berthet & Astier) Donadini (1987), except for the small and sessile apothecia. The presence of cyanophilous spore markings excludes the species from *Plectania* and from *Urnula*, but it fits *Neournula*. The fungus differs obviously from the type species *N. pouchetii* (Berthet & Riousset) Paden (1972) in spore shape and size. This is a new record for China.

Donadinia Bellem. & Mel.-Howell, established later and based on *U. helvelloides* (Bellemere, *et al.*, 1990), is not distinguishable from *Neournula* at the generic level.

PLECTANIA Fuckel

Plectania is a relatively large genus in the Sarcosomataceae. When Paden (1984) reviewed the neotropical species of the genus, he divided the genus into four sections according to the ascospore shapes which vary significantly among sections. His taxonomic treatment is accepted in this study. *Plectania* contains fungi which have a differentiated ectal excipulum of textura angularis and medullary excipulum of textura intricata, dark-colored hairs on receptacle surface, and ascospores that may be spherical, ellipsoid, suballantoid, or asymmetrically ellipsoid with one side bearing transverse furrows. Early Chinese records of three *Plectania* species were placed in the genera *Urnula* and *Pseudoplectania* (Teng, 1963, 1996). *P. platensis* (Speg.) Rifai was found later (Zhuang, 1989). *P. yunnanensis* was discovered in this study and is described as a new species.

Plectania campylospora (Berk.) Nannf., Mycologia 49: 110, 1957.

≡ *Urnula campylospora* (Berk.) Cooke, Handb. Austral. Fungi p. 268, 1892.

Specimens examined: **Guangxi**: on rotten wood, Jinzhongshan, Longlin, L. W. Xu 061, 19 X 1957, HMAS 26824; **Hainan**: Ledong, alt. 900m, M. Zang 11689, 15 XII 1989, HKAS 22251, HMAS 72318; **Yunnan**: Menglun, S. K. Chen, 11 XI 1988, HKAS 20528, HMAS 72319.

Ascospores of the Chinese collections are curved strongly, ellipsoid to kidney-shaped, with 2-3 large guttules, and 23-29 x 7.5-11 µm. Apothecia are 1-3.5 cm when dry.

Plectania melastoma (Sowerby : Fr.) Fuckel, Jahrb. Nass. Vereins Naturk. 23-24: 324, 1870.

≡ *Urnula melastoma* (Sowerby : Fr.) Boud., Hist. Class. Disc. Eur. p. 55, 1907.

Distribution: Hainan.

This species was reported by Teng (1996). Specimen is no longer available in HMAS.

Plectania nigrella (Pers. : Fr.) P. Karst., Acta Fauna Fl. Fennica 2: 119, 1885.

≡ *Pseudoplectania nigrella* (Pers. : Fr.) Fuckel, Jahrb. Nass. Vereins Naturk. 23-24: 324, 1870.

Specimens examined: **Hubei**: Kiulunghsien, Si Kang, S. C. Teng, 20 V 1939, CUP-CH 1611, HMAS 56514; **Sichuan**: on trunk of *Picea auranciaca*, Huanglongsi, Songpan, 3200m, M. Zang 11566, 5 VII 1989, HKAS 21974; on mosses, Huanglongsi, Songpan, 3100m, M. Zang 11570, 5 VII 1989, HKAS 21979; **Xizang**: on rotten wood under *Picea* sp., Sejilashan, Linzhi, alt. 3700m, A. S. Xu 97001, 3 VI 1997, HXZE 1115, HMAS 72021.

Apothecia of the Chinese collections are larger than those described by Seaver (1928), Dennis (1978) and Paden (1984) for the American and European material and reach 10 cm in diam when fresh. Ascospores of our material are mostly 10-13 µm in diam. HMAS 56514 from Hubei has larger spores (11-14 µm in diam) than others and is similar to that reported by Otani (1980) from Japanese collections.

This species was formerly placed in *Pseudoplectania* (Teng, 1963; Korf, 1973; Dennis, 1978). Structurally, *Pseudoplectania* is very similar to *Plectania* and differs only in spherical ascospores. In fact, *Plectania*, even taken in a narrow sense (excluding *Pseudoplectania*), contains already species having diverse shapes of spores. There seems no reason to exclude spherical-spored *Pseudoplectania* species from that genus. We agree with Paden's (1984) generic concept of *Plectania.*

Plectania platensis (Speg.) Rifai, Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 57(3): 29, 1968.

Specimen examined: **Hubei**: on wood under soil surface, Songbaizhen, Shennongjia, alt. 1000m, J. X. Tian, 29 VI 1984, HMAS 53677.

Ascospores of the Chinese collections are 18-22 x 10-12 x 7-8 µm and with 8-12 transverse furrows on one side. It is similar to the Australasian material (Rifai, 1968).

Plectania yunnanensis W. Y. Zhuang, **sp. nov.** (Fig. 1)

Ab *Plectania campylospora* ascosporis ellipsoideis, non-allantoideis, grandis, 35-42 x 14-17 µm differt. Ab *Plectania chilensis* ascis latioribus, 21-15 µm in latis; ascosporis grandis, 35-42 x 14-17 µm differt.

Apothecia discoid, sessile, 10-16 mm in diameter when dry, hymenium dark brown, receptacle black, covered with brown hairs. Hairs cylindrical, smooth-walled, septate, brown, 4.5-7.5 µm wide, short protrusions light brown. Ectal excipulum of textura angularis, 80-100 µm thick; cells 10-30 x 8-23 µm, walls brown. Medullary excipulum of textura intricata, 50-300 µm thick or thicker, hyphae subhyaline to pale yellow, 2.5-5.0 µm wide, walls roughened to smooth. Subhymenium 38-50 µm thick, brown in mass. Hymenium 330-345 µm thick. Asci subcylindrical, J-, walls not blue in Melzer's reagent, 21-25 µm wide. Ascospores uniseriate, ellipsoid, some with one side flat, smooth-walled, with 2-4 guttules, 35-42 x 13-18 µm. Paraphyses two types, normal ones filiform, densely septate, slightly enlarged at and branched near apex, 2.5-3.5 µm wide; so-called hymenial hairs subcylindrical, non-septate, sometimes slightly bent at the apex, 3.5-4.5 µm wide.

Holotype: on rotten twig, Ailaoshan, Jingdong, Yunnan, alt. 2350m, Z. L. Yang 1678, 27 VIII 1991, HKAS 24423, isotype HMAS 72018.

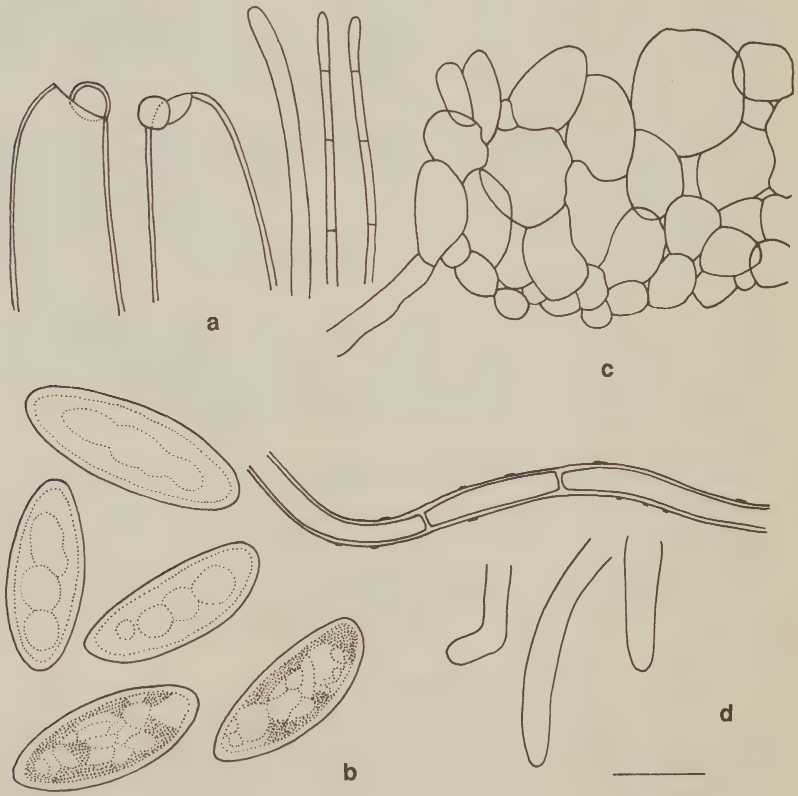

Fig. 1. *Plectania yunnanensis*: **a**. two ascus apices and portion of two types of paraphyses; **b**. five ascospores; **c**. ectal excipulum near margin; **d**. a fragment of long hair with roughened wall and three short hairs with smooth walls. Bar = 20 µm. From holotype.

Notes: In the genus *Plectania*, *P. campylospora* and *P. chilensis* (Mont.) Gamundi are the closest species to *P. yunnanensis*. The new species is different from the former in ascospores not curved but ellipsoid and sometimes flat at one side, larger (35-42 x 14-17 µm vs. 22.7-31.8 x 9.1-12.6 µm) (Rifai, 1968). It differs from the latter in much wider asci (21-25 µm wide vs. 18.3-20.3 µm wide) and larger ascospores (35-42 x 14-17 µm vs. 25-32 x 8.8-10.8 µm) (Gamundi, 1971).

URNULA Fr.

The genus is taken here in a restricted sense following the treatment by Korf (1972, 1973). Dissing (1981) provided a key to four species of the genus in which species with both urnulate and subglobose, and with both stipitate and subsessile fruitbodies are included. He broadened slightly the generic concept. *Urnula craterium* (Schwein.) Fr. is the only species recognized in China (Teng, 1996).

Urnula craterium (Schwein.) Fr., Nova Acta Soc. Sci. Upsal. III, 1: 122, 1851.

Specimen examined: **Heilongjiang**: Liangshui, Dailing, C. D. Xiang, V 1958, HMAS 33642.

This species is characterized by its deeply cupulate to infundibuliform and stipitate apothecia, dark and smooth-walled hairs on receptacle surface, and ellipsoid ascospores which are symmetrical, non-guttulate, and with homogenous, refractive contents. Ascospores of the Chinese collection are 23-33 x 10-13 µm which is identical with the North American material (Seaver, 1928) and Japanese ones (Otani, 1980).

WOLFINA Seaver ex Eckblad

The genus is characterized by the corky texture of the fruitbody when dry, a thick and dense layer of dark mycelium covering or underneath the receptacle surface, lack of delimitation between the ectal excipulum and medullary excipulum, and presence of cyanophilous striations on spore surface (Eckblad, 1968).

Wolfina oblongispora (J. Z. Cao) W. Y. Zhuang & Z. Wang, **comb. nov.** (emended) (Fig. 2)

Basionym: *Galiella oblongispora* J. Z. Cao, Mycologia 84: 261, 1992.

Apothecia discoid to turbinate, sessile, 3-3.5 cm in diam when dry; hymenium orange-beige to clay-yellow when dry, receptacle dark brown, surface with a dense and thick layer of dark brown hairs (apothecia seated on a hair cushion); excipular tissues corky when dry. Hairs subcylindrical, blunt at apex, septate, walls smooth, roughened throughout or granulate at lower portion and smooth at the upper. Entire excipulum of uniform textura intricata, tissues gelatinous, hyphae hyaline, 2-5 µm wide, walls somewhat refractive. Hymenium 800-900 µm thick. Subhymenium 100 µm thick. Asci subcylindrical, 4-8-spored, mature asci usually with less than 8 spores, J- in Melzer's reagent, 22-27 µm wide. Ascospores uniseriate, ellipsoid, with blunt ends, hyaline, with longitudinal striations on surface, occasionally striations running diagonally or transversely and warts mixed with striations, multiguttulate, 36-45 x (15-)17.5-22 µm. Paraphyses filiform, 2.5-4.0 µm wide.

Specimens examined: **Fujian**: on rotten wood, Nanjing, S. C. Teng 5384, 12 VI 1956, HMAS 29565; **Yunnan**: on rotten wood in broadleaf forest, Puer, alt. 1200m, Z. L. Yang 1188, 27 VIII 1990, HKAS 23300, HMAS 72178.

The genus *Wolfina* was established or validated based on a single species, *W. aurantiopsis* (Ellis) Eckblad (1968), and remained monotypic (Hawksworth *et al.*, 1995). The type species was thoroughly described and well-illustrated by Seaver (1937, 1942) and Eckblad (1968). In our recent study, two collections from Fujian and Yunnan, including the holotype of *Galiella oblongispora*, are observed. They have

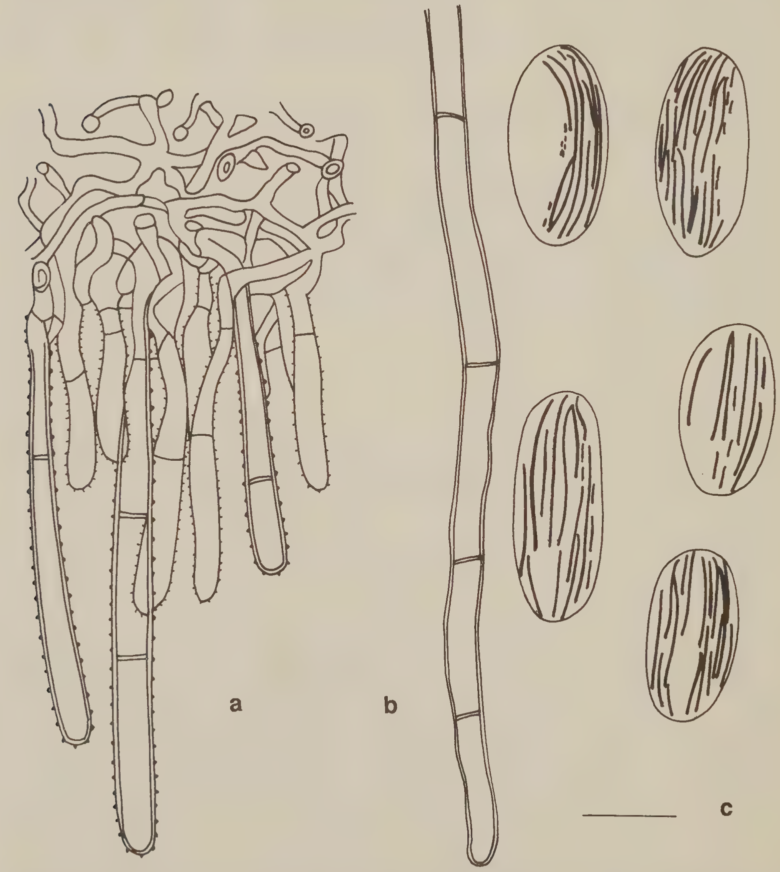

Fig. 2. *Wolfina oblongispora*: **a**. excipulum structure and marked short hairs, from HKAS 23300; **b**. a long smooth-walled hair, from HKAS 23300; **c**. ascospores, the upper two from HKAS 23300 and lower three from HMAS 29565. Bar = 20 µm.

every characteristic of *Wolfina*. The fungus differs from *W. aurantiopsis* in much larger asci and ascospores (36-45 x 15-22 µm vs. 27-33 x 16-18 µm) and occasionally spore striations running diagonally or transversely and warts mixed with striations in addition to the longitudinal stripes. The holotype of *G. oblongispora* was examined carefully. We found that when Cao *et al.* (1992) described the fungus they overlooked the cyanophilous striations on the spore surface and mistakenly noted that "ectal excipulum 80-100 µm thick, of textura angularis to textura globulosa, sharply differentiated from the medullary excipulum". We transfer this fungus to the genus *Wolfina*, redescribe and reillustrate it, and emend the original description.

Otani (1975) published *W. papuana* Otani which has smooth ascospores and a differentiated ectal excipulum and medullary excipulum. It should be excluded from *Wolfina*. We do not have a suitable position for it until type material is examined.

ACKNOWLEDGEMENTS

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中国肉盘菌科研究概况

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在对现存肉盘菌科 Sarcosomataceae 标本进行研究基础上，本文列出中国该科已知盘菌 11 种，其中云南暗盘菌 (*Plectania yunnanensis*) 为新种，长孢沃尔夫盘菌 (*Wolfina oblongispora*) 和马鞍状新脚杯菌 (*Neournula helvelloides*) 为新组合。

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A LIST OF DISCOMYCETES IN CHINA*

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In his eminent work *Sylloge Fungorum Sinicorum*, Tai (1979) provided a complete list of fungi in China reported from the 19th century to the 70's of this century. Nearly 300 discomycete names appeared in the book. In order to update the information and to glance at progress on studies of fungal species diversity in the past 20 years or so, a name list of discomycetes hitherto known from China are summarized in this paper. It is, by no means, a taxonomic treatment but mainly a literature work.

Three parts are shown for each species, *i.e.* scientific name, Chinese name, and reference(s) related to the name. Names which appeared in the *Sylloge Fungorum Sinicorum* are not referred to the author(s) who first recorded the species from China but all to Tai (1979) where one may find the original information. Fungi published or reported after Tai (1979) are followed by the author(s) who first discovered the taxa in China. If names used in the past do not fit the modern taxonomy, name changes are indicated. However, due to the limited available literature at hand, formerly reported names may be copied when the position of a fungus is uncertain or a formal transfer to a proper genus is unknown, such as some species in *Helotium*, *Dasyscyphus*, etc. Chinese names are only useful within China. To save space, author abbreviations are applied to some of the references following the species names. The abbreviated author(s) and the full author names are both included in the references at the end this paper.

LIST OF THE KNOWN DISCOMYCETES IN CHINA
（中国盘菌名录）

Acervus epispartius (Berk. & Broome) Pfister 小孢盘菌 (K&Z 1985)
Acervus epispartius forma *albus* Korf & W. Y. Zhuang 小孢盘菌白色变型 (Z&K 1989)
Acetabula purpurea M. Zang = *Otidea purpurea* (Zang 1979)
Aleuria aurantia (Pers. : Fr.) Fuckel 网孢盘菌 (T 1979)

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Aleuria rhenana Fuckel = *Sowerbyella rhenana* (T 1979)
Aleurina americana W. Y. Zhuang 美洲饰孢盘菌 (Z 1995)
Aleurina ferrugineus (W. Phillips) W. Y. Zhuang & Korf 锈色饰孢盘菌 (WW&Z 1996)
Aleurina imaii (Korf) W. Y. Zhuang 伊迈饰孢盘菌 (K&Z 1985, Z&K 1986)
Aleurina kaushalii (J. Moravec) W. Y. Zhuang & Korf = *Otideopsis kaushalii* (K&Z 1987)
Arachnopeziza cornuta (Ellis) Korf 角蛛盘菌 (K&Z 1985)
Arachnopeziza subnuda Korf & W. Y. Zhuang 近裸蛛盘菌 (K&Z 1985)
Ascobolus archeri Berk. 阿氏粪盘菌 (WW&Z 1996)
Ascobolus carbonarius P. Karst. 炭色粪盘菌 (T 1979)
Ascobolus castaneus Teng 栗粪盘菌 (T 1979)
Ascobolus cervinus Berk. & Broome 黄褐粪盘菌 (Z 1996)
Ascobolus citrinus G. Schweiz. = *Ascobolus michaudii* (Liou & Chen 1977a)
Ascobolus crenulatus P. Karst. 细齿粪盘菌 (T 1979, Liou & Chen 1977a)
Ascobolus denudatus Fr. 光粪盘菌 (Wang 1993, Z&W 1998a)
Ascobolus furfuraceus Pers. 糠状粪盘菌 (Liou & Chen 1977a)
Ascobolus immersus Pers. 埋粪盘菌 (Wang 1993)
Ascobolus lignatilis Alb. & Schwein. 木生粪盘菌 (Liou & Chen 1977a)
Ascobolus lineolatus Brumm. 细纹粪盘菌 (Liou & Chen 1977a)
Ascobolus magnificus Dodge = *Ascobolus scatigenus* (T 1979)
Ascobolus mancus (Rehm) Brumm. 矮粪盘菌 (Wang 1993)
Ascobolus michaudii Boud. 米氏粪盘菌 (Liou & Chen 1977a)
Ascobolus reticulatus Brumm. 网粪盘菌 (Wang 1993)
Ascobolus sacchariferus Brumm. 糖粪盘菌 (WW&Z 1996)
Ascobolus scatigenus (Berk.) Brumm. 寡纹粪盘菌 (T 1979, Liou & Chen 1977a)
Ascobolus stercorarius (Bull.) J. Schroet. 牛粪盘菌 (T 1979)
Ascobolus viridulus W. Phillips & Plowr. = *Ascobolus crenulatus* (T 1979)
Ascocoryne cylichnium (Tul.) Korf 杯紫胶盘菌 (T 1979, Z&K 1989)
Ascocoryne sarcoides (Jacq.) J. W. Groves & D. E. Wilson 肉质紫胶盘菌 (T 1979, Groves & Wilson 1967)
Ascodesmis macrospora Obrist 大孢瓶束盘菌 (Wang 1995)
Ascodesmis microscopica (P. Crouan) Seaver (excl. descr.) 微瓶束盘菌 (Liou & Chen 1977a)
Ascodesmis nigricans Tiegh. 瓶束盘菌 (Liou & Chen 1977a)
Ascodesmis porcina Seaver 猪瓶束盘菌 (Liou & Chen 1977a)
Ascodesmis sphaerospora Obrist 球孢瓶束盘菌 (Liou & Chen 1977a)
Ascophanus carneus (Pers. : Fr.) Boud. 肉色艳盘菌 (T 1979)
Ascophanus granulatus (Bull.) Speg. 粒状艳盘菌 (T 1979)
Ascophanus isabellinus Clem. 白艳盘菌 (T 1979)
Ascophanus ochraceus (P. Crouan & H. Crouan) Boud. 赭黄艳盘菌 (T 1979)
Ascosparassis heinricheri (Bres.) Pfister 锈球盘菌 (T 1979, Pfister & Halling 1989)
Ascosparassis shimizuensis Kobayasi = *Ascoparassis heinricheri* (T 1979)
Ascotremella faginea (Peck) Seaver 山毛榉胶盘菌 (T 1979)
Ascotremella turbinata Seaver = *Neubulgaria pura* (T 1979)
Ascotremellopsis bambusicola Teng & S. H. Ou = *Myriodiscus sparassoides* (T 1979)
Balsamia platyspora Berk. 阔孢巴氏块菌 (Liu &Tao 1990)

Bifusella cunninghamiicola Korf & Ogimi 杉生小双梭孢盘菌 (LT&L 1993)

Bifusella tzugae H. S. Cao & C. L. Hou 铁杉小双孢盘菌 (CHH&Y 1996)

Bisporella citrina (Batsch : Fr.) Korf & S. E. Carp. 橘色小双孢盘菌 (T 1979, Korf & Carpenter 1974)

Bisporella clavoflava (Grev.) Lizon & Korf 黄小双孢盘菌 (K&Z 1985, Lizon & Korf 1995)

Bisporella discedens (P. Karst.) S. E. Carp. = *Bisporella clavoflava* (K&Z 1985)

Bisporella subpallida (Rehm) Dennis 近白小双孢盘菌 (T 1979, Dennis 1978)

Boedijnopeziza insititia (Berk. & M. A. Curtis) S. Ito & S. Imai = *Cookeina insititia* (Liou & Chen 1977)

Botryotinia arachidis (Hanz.) W. Yamam. 落花生葡萄孢盘菌 (T 1979, Kohn 1979)

Botryotinia fabae J. Y. Lu & T. H. Wu 蚕豆葡萄包盘菌 (Wu & Lu 1991)

Botryotinia fritillarii-pallidiflori Q. T. Chen & J. L. Li 伊贝母葡萄孢盘菌 (Li & Chen 1987)

Botryotinia fuckeliana (de Bary) Whetzel 富克葡萄孢盘菌 (T 1979, Kohn 1979)

Botryotinia moricola (I. Hino) W. Yamam. 桑生葡萄孢盘菌 (T 1979, Kohn 1979)

Boubovia ascoboloides (Korf & W. Y. Zhuang) Y. J. Yao & Spooner 粪盘状拟垫盘菌 (K&Z 1984, Yao & Spooner 1996)

Bulgaria inquinans (Pers.) Fr. 污胶鼓菌 (T 1979)

Byssonectria aggregata (Berk. & Broome) J. R. Rogers & Korf 聚毡盘菌 (K&Z 1985)

Calycella citrina (Hedw.) Quel. ?= *Bisporella citrina* (T 1979)

Calycellina carolinensis Nag Raj & W. B. Kendr. 卡地黄杯菌 (K&Z 1985)

Calycellina minuta K. S. Thind & M. P. Sharma 小黄杯菌 (K&Z 1985)

Calycellina populina (Fuckel) Hohn. 杨黄杯菌 (T 1979)

Calycellinopsis xishuangbanna W. Y. Zhuang 拟黄杯菌 (Z 1990)

Calycina herbarum (Pers. : Fr.) Gray 草本半杯菌 (T 1979, Z&K 1989)

Catinella olivacea (Batsch) Boud. 棕绿小碗菌 (T 1979)

Cenangium abietis (Pers.) Duby 冷杉薄盘菌 (T 1979)

Cenangium atrofuscum S. H. Ou 黑褐薄盘菌 (T 1979)

Cenangium furfuraceum (Roth) Sacc. 糠麸薄盘菌 (T 1979)

Cenangium japonicum (P. Henn.) Miura日本薄盘菌 (T 1979)

Cenangium populneum (Pers.) Rehm 杨薄盘菌 (T 1979)

Cheilymenia ciliata (Bull.) Maas Geest. 毛缘刺盘菌 (Z 1996)

Cheilymenia coprinaria (Cooke) Boud. 粪缘刺盘菌 (T 1979)

Cheilymenia fimicola (De Not. & Bagl.) Dennis 粪生缘刺盘菌 (WW&Z 1996, Z 1998)

Cheilymenia granulata (Bull. : Fr.) J. Moravec 粒缘刺盘菌 (Liou & Chen 1977a, Wang 1993)

Cheilymenia magnifica (W. Y. Zhuang & Korf) J. Moravec 大缘刺盘菌 (Z&K 1989, Moravec 1990)

Cheilymenia striata (K. S. Thind, E. K. E. K. Cash & Pr. Singh) J. Moravec 条缘刺盘菌 (Wang 1995, Z 1996)

Cheilymenia theleboides (Alb. & Schwein.) Boud. 黄缘刺盘菌 (T 1979)

Chlorencoelia torta (Schwein.) J. R. Dixon 扭曲绿散胞盘菌 (Z&W 1998)

Chlorencoelia versiformis (Pers.) J. R. Dixon 绿散胞盘菌 (T 1979, Z&W 1998)

Chlorociboria aeruginascens (Nyl.) Kanouse ex C. S. Ramamurthi, Korf & L. R. Batra 小孢绿杯菌 (T 1979, Z 1995)

Chlorociboria aeruginosa (Pers. : Fr.) Seaver ex C. S. Ramamurthi et al. 绿杯菌 (T 1979, Z 1995)

Chloroscypha platycladus Y. S. Dai 侧柏绿胶杯菌 (D 1992)
Chloroscypha seaveri Seaver 西沃绿胶杯菌 (Z 1995)
Chlorosplenium aeruginascens (Nyl.) P. Karst. = *Chlorociboria aeruginascens* (T 1979)
Chlorosplenium aeruginosum (Oeder) De Not. = *Chlorociboria aeruginosa* (T 1979)
Chlorosplenium chlora (Schwein. : Fr.) M. A. Curtis 绿盘菌 (K&Z 1985)
Chlorosplenium fusisporum S. C. Liou & Z. C. Chen 梭孢绿盘菌 (Liou & Chen 1977)
Choiromyces alveolatus (Harkn.) Trappe 蜂窝孢猪块菌 (Liu & Tao 1990)
Ciboria amentacea (Balbis : Fr.) Fuckel 柔荑花杯盘菌
Ciboria americana E. J. Durand 美洲杯盘菌 (Z 1994)
Ciboria batschiana (Zopf) N. F. Buchw. 栎杯盘菌 (Z 1995)
Ciboria betulae (Woronin) W. L. White 桦杯盘菌 (Z 1995)
Ciboria bolaris (Batsch) Fuckel 保拉杯盘菌 (Z 1995)
Ciboria carunculoides (Siegl. & Jenkins) Whetzel & F. A. Wolf 肉阜状杯盘菌 (T 1979)
Ciboria guizhouensis W. Y. Zhuang 贵州杯盘菌 (Z 1994)
Ciboria peckiana (Cooke) Korf 佩克杯盘菌 (K&Z 1985)
Ciboria pseudotuberosa Rehm = *Ciboria batschiana* (T 1979)
Ciboria shiraiana (P. Henn.) Whetzel 桑实杯盘菌 (T 1979)
Ciboria sydowiana Rehm = *Rutstroemia sydowiana* (T 1979)
Ciborinia allii (Sawada) L. M. Kohn 葱叶杯菌 (T 1979, Kohn 1979)
Ciborinia hemisphaerica W. Y. Zhuang & Z. Wang 半球叶杯菌 (Z&W 1997a)
Ciborinia jinggangensis W. Y. Zhuang & Z. Wang 井冈叶杯菌 (Z&W 1997a)
Claussenomyces dacrymycetoideus Ouell. & Korf 花耳状小胶盘菌 (K&Z 1985)
Coccomyces coronatus (Schumach.) De Not. 冠状齿裂菌 (T 1979)
Coccomyces delta (Kunze) Sacc. 三角形齿裂菌 (T 1979)
Coccomyces dentatus (Kunze & J. C. Schmidt) Sacc. 齿裂菌 (T 1979)
Coccomyces guizhouensis Y. R. Lin & B. F. Hu 贵州齿裂菌 (LLT&H 1994)
Coccomyces hiemalis B. B. Higgins 冬齿裂菌 (T 1979)
Coccomyces keteleeriae Y. R. Lin 油杉齿裂菌 (LLT&H 1994)
Coccomyces mucronatus Korf & W. Y. Zhuang 尖丝齿裂菌 (K&Z 1985)
Coccomyces sichuanensis Korf & W. Y. Zhuang 四川齿裂菌 (K&Z 1985)
Cookeiana colensoi Seaver 皱缘毛杯菌 (T 1979)
Cookeiana indica Pfister & R. Kaushal 印度毛杯菌 (W 1997)
Cookeiana insititia (Berk. & M. A. Curtis) Kuntze 大孢毛杯菌 (T 1979)
Cookeiana sinensis Z. Wang 中国毛杯菌 (W 1997)
Cookeiana speciosa (Fr. : Fr.) Dennis 艳毛杯菌 (T 1979, Dennis 1994, W 1997)
Cookeiana sulcipes (Berk.) Kuntze = *Cookeiana speciosa* (T 1979)
Cookeiana tricholoma (Mont.) Kuntze 毛缘毛杯菌 (T 1979)
Coprobia granulata (Bull. : Fr.) Boud. = *Cheilymenia granulata* (Liou & Chen 1977a, Liu 1990)
Coprobia magnifica W. Y. Zhuang & Korf = *Cheilymenia magnifica* (Z&K 1989)
Coprobia striata (K. S. Thind, E. K. E. K. Cash & Pr. Singh) Wareitch = *Cheilymenia striata* (Z 1996)
Coprotus disculus Kimbr. 小圆粪裸盘菌 (Wang 1993)
Coprotus glaucellus (Rehm) Kimbr. 光粪裸盘菌 (WW&Z 1996)
Coprotus leucopocillus Kimbr. 亮杯粪裸盘菌 (Liou & Chen 1977a)

Coprotus maginatus Kimbr., Luck-Allen & Cain 大粪裸盘菌 (WW&Z 1996)
Coprotus niveus Kimbr. 雪白粪裸盘菌 (Wang 1993)
Coprotus ochraceus (P. Crouan & H. Crouan) J. Moravec 黄粪裸盘菌 (Wang 1993)
Coprotus sexdecimsporus (P. Crouan & H. Crouan) Kimbr. & Korf 十六孢粪裸盘菌 (Wang 1995)
Coprotus uncinatus Y. Z. Wang 钩粪裸盘菌 (Wang 1994)
Cordierites frondosa (Kobayasi) Korf = *Ionomidotis frondosa* (Liu, Cao & Zhang 1988)
Cordierites sprucei Berk. 斯氏复柄盘菌 (Z&K 1989)
Coryne sarcoides (Jacq.) Tul. & C. Tul. = *Ascocoryne sarcoides* (T 1979)
Coryne urnalis (Nyl.) Sacc. = *Ascocoryne cylichnium* (T 1979)
Crocicreas cyathoideum (Bull. : Fr.) S. E. Carp. 杯状胶被盘菌 (T 1979, Z&K 1989)
Cudonia circinans (Pers.) Fr. 旋卷地锤菌 (T 1979)
Cudonia confusa Bres. 红地锤菌 (T 1979)
Cudonia helvelloides S. Ito & S. Imai 马鞍菌状地锤菌 (T 1979)
Cudonia lutea (Peck) Sacc. 黄地锤菌 (T 1979)
Dasyscyphus acutipilus (P. Karst.) Sacc. 尖毛钉菌 (WW&Z 1996)
Dasyscyphus agassizii (Berk. & M. A. Curtis) Sacc. 大毛钉菌 (T 1979)
Dasyscyphus apala (Berk. & M. A. Curtis) Dennis 软毛钉菌 (Liou & Chen 1977)
Dasyscyphus bicolor (Bull.) Fuckel 二色毛钉菌 (T 1979)
Dasyscyphus calyciformis (Willd.) Rehm 萼状毛钉菌 (T 1979)
Dasyscyphus calyculiformis (Schumach.) Rehm 副萼状毛钉菌 (T 1979)
Dasyscyphus cerineus (Pers.) Fuckel 淡黄毛钉菌 (T 1979)
Dasyscyphus comitessae (Cooke) Sacc. 分枝毛钉菌 (T 1979)
Dasyscyphus foliicola (Keissl.) F. L. Tai 叶生毛钉菌 (T 1979)
Dasyscyphus fuckelii (Bres.) Velen. 毛钉菌 (T 1979)
Dasyscyphus leucophaea (Pers.) Massee 白色毛钉菌 (Liou & Chen 1977)
Dasyscyphus niveus (Hedw.) Sacc. 雪白毛钉菌 (T 1979)
Dasyscyphus nudipes (Fuckel) Sacc. = *Lachnum nudipes* (Liou & Chen 1977)
Dasyscyphus ochroleucus Penz. & Sacc. 黄白毛钉菌 (T 1979)
Dasyscyphus subcorticalis (Pat.) Dennis var. *wulaiensis* S. C. Liou & Z. C. Chen 亚木毛钉菌乌莱变种 (Liou & Chen 1977)
Dasyscyphus virgineus (Batsch) Fuckel = *Lachnum virgineum* (T 1979)
Dermea cerasi (Pers.) Fr. 樱皮盘菌 (T 1979)
Dermea prumi (Teng) J. W. Groves 李皮盘菌 (T 1979)
Dicephalospora calochora (H. Sydow) Spooner 二头孢盘菌 (WW&Z 1996)
Dicephalospora rufocornea (Berk. & Broome) Spooner 红二头孢盘菌 (T 1979, Dumont 1980, K&Z 1985, Spooner 1987, Z 1991)
Diplocarpon rosae F. A. Wolf 蔷薇双盘菌 (T 1979)
Discina biondiana Arc. 皱突平盘菌 (T 1979)
Discina mongolica P. Karst. 蒙古平盘菌 (T 1979)
Discina perlata (Fr.) Fr. 珠亮平盘菌 (T 1979)
Disciotis venosa (Pers.) Boud. 肋状皱盘菌 (T 1979)
Dumontinia tuberosa (Bull. : Fr.) L. M. Kohn 杜蒙盘菌 (Z 1996)
Encoelia helvola (Jungh.) Overeem 黄散胞盘菌 (Z&K 1989)
Episclerotium sclerotiorum (Rostr.) L. M. Kohn 核外盘菌 (T 1979, Kohn & Nasagawa 1984)

Erinellina cervina (Ellis & Everh.) Seaver 鹿皮色亚棘盘菌 (T 1979)
Erinellina corticola (Massee) Teng = *Lachnum abnorme* (T 1979)
Erinellina javanica (P.Henn. & Nym.) Teng = *Lachnum javanicum* (T 1979)
Erinellina neilliae (Keissl.) F. L. Tai 绣线梅亚棘盘菌 (T 1979)
Erinellina sinensis (Teng) Teng = *Lachnum abnorme* (T 1979)
Erinellina tomentella (Penz. & Sacc.) F. L. Tai 茸毛亚棘盘菌 (T 1979)
Fischerula macrospora Mattir. 费歇块菌 (Liu &Tao 1988)
Galiella amurensis (Lj. N. Vass.) Raitv. 黑龙江盖尔盘菌 (T 1979, CF&L 1992)
Galiella celebica (Henn.) Nannf. 小孢盖尔盘菌 (Z&W 1998b)
Galiella javanica (Rehm) Nannf. & Korf 爪哇盖尔盘菌 (T 1979, K&Z 1985)
Galiella oblongispora J. Z. Cao = *Wolfina oblongispora* (CF&L 1992, Z&W 1998b)
Galiella sinensis J. Z. Cao = *Galiella celebica* (CF&L 1992, Z&W 1998b)
Galiella thwaitesii (Berk. & Broome) Nannf. 苏维盖尔盘菌 (T 1979, Korf 1957)
Gelatinopsis geoglossi (Ellis & Everh.) Rambold & Triebel 拟胶盘菌 (K&Z 1985, Rambold & Triebel 1990, Z 1991)
Genea fragilis (Tul. & C. Tul.) B. C. Zhang 易碎囊被块菌 (Zhang 1990)
Genea sinensis B. C. Zhang 中国囊被块菌 (Zhang 1991)
Genea variabilis B. C. Zhang 变异囊被块菌 (Zhang 1991)
Geneosperma geneosporum (Berk.) Rifai 须孢盘菌 (K&Z 1987)
Geneosperma geneosporum forma *guangxiense* W. Y. Zhuang 须孢盘菌广西变型 (Z 1994)
Geoglossum alveolatum (Rehm) E. J. Durand 泡地舌菌 (Z&W 1997)
Geoglossum cookeianum Nannf. 库克地舌菌 (Z&W 1997)
Geoglossum elongatum F. L. Tai = *Geoglossum umbratile* (T 1979, Z&W 1997)
Geoglossum fallax E. J. Durand 假地舌菌 (T 1979)
Geoglossum glabrum Pers. = *Geoglossum cookeianum* (T 1979, Z&W 1997)
Geoglossum glabrum var. *angustosporum* F. L. Tai = *Geoglossum cookeianum* (T 1979, Z&W 1997)
Geoglossum glutinosum Pers. 粘地舌菌 (T 1979)
Geoglossum laccatum W. Y. Zhuang 亮丝地舌菌 (Z&W 1997)
Geoglossum nigritum (Fr.) Cooke = *Geoglossum umbratile* (T 1979, Z&W 1997)
Geoglossum nigritum var. *cheoanum* F. L. Tai = *Geoglossum umbratile* (T 1979, Z&W 1997)
Geoglossum ophioglossoides (L.) Rehm 瓶尔小草状地舌菌 (Zang 1983)
Geoglossum pumilum G. Winter 小地舌菌 (Z&W 1997)
Geoglossum pusillum F. L. Tai 细小地舌菌 (T 1979)
Geoglossum simile Peck 相似地舌菌 (Z&W 1997)
Geoglossum sinense F. L. Tai = *Geoglossum umbratile* (T 1979, Z&W 1997)
Geoglossum umbratile Sacc. 荫蔽地舌菌 (T 1979)
Geoglossum umbratile var. *heterosporum* (Mains) Maas Geest.荫蔽地舌菌异孢变种 (Z&W 1997)
Geopora arenicola (Lev.) Kers 砂生地孔菌 (T 1979, Zhang & Yu 1992)
Geopora cooperi Harkn. 地孔菌 (Liu & Tao 1988)
Geopora cooperi forma *gilkayae* Burdsall 地孔菌球孢变型 (Song 1993)
Geopora foliacea (Schaeff.) S. Ahmad 叶质地孔菌 (Zhang & Yu 1992)
Geopora perprolata B. C. Zhang 梭椭孢地孔菌 (Zhang & Yu 1992)
Geopyxis catinus (Holmsk. : Fr.) Sacc. = *Tarzetta catinus* (T 1979)

Geopyxis cupularis (L.) Sacc. = *Tarzetta cupularis* (T 1979, Z&W 1997)
Geopyxis cf. *majalis* (Fr.) Sacc. 大孢地杯菌 (Z&W 1998)
Geopyxis vulcanalis (Peck) Sacc. 小孢地杯菌 (T1979)
Godronia sororia P. Karst. 成堆长孢盘菌 (T 1979)
Godronia urceolus (Alb. & Schwein.) P. Karst. 壶形长孢盘菌 (T 1979)
Godronia zelleri Seaver 泽勒长孢盘菌 (T 1979)
Gorgoniceps carneola (Penz. & Sacc.) Keissl. 肉色恶柄盘菌
Greletia planchonis (Dunal ex Boud.) Donadini = *Smardaea planchonis* (K&Z 1985)
Gyromitra ambigua (P. Karst.) Harmaja 含糊鹿花菌 (CF&L 1990a)
Gyromitra esculenta (Pers.) Fr. 鹿花菌 (T 1979)
Gyromitra fastigiata (Krombh.) Rehm 帚状鹿花菌 (CF&L 1990a)
Gyromitra infula (Schaeff. : Fr.) Quel. 带鹿花菌 (CF&L 1990a)
Gyromitra lactea J. Z. Cao, L. Fan & B. Liu 乳白鹿花菌 (CF&L 1990a)
Gyromitra perlata (Fr.) Harmaja 平盘鹿花菌 (CF&L 1990a)
Gyromitra sichuanensis Korf & W. Y. Zhuang 四川鹿花菌 (K&Z 1985)
Gyromitra splendida Raitv. 亮鹿花菌 (CF&L 1990a)
Gyromitra xinjiangensis J. Z. Cao, L. Fan & B. Liu 新疆鹿花菌 (CF&L 1990a)
"*Helotium*" *buccinum* (Pers.) Fr. 长黄柔膜菌 (T 1979)
"*Helotium*" *conformatum* (P. Karst.) Rehm 叶白柔膜菌 (Zang 1983)
Helotium conscriptum (P. Karst.) P. Karst. = *Hymenoscyphus calyculus* (WW&Z 1996)
Helotium epiphyllum (Pers.) Fr. = *Hymenoscyphus epiphyllus* (T 1979)
Helotium friesii (Weinm.) Sacc. = *Hymenoscyphus friesii* (T 1979)
Helotium fructigenum (Bull.) P. Karst. = *Hymenoscyphus fructigenus* (T 1979)
"*Helotium*" *hariotii* (Boud.) Sacc. 哈里奥柔膜菌 (T 1979)
Helotium herbarum (Pers.) Fr. = *Calycina herbarum* (T 1979)
"*Helotium*" *hongkongense* (Berk. & M. A. Curtis) Sacc. 香港柔膜菌 (T 1979)
Helotium immutabile Fuckel = *Hymenoscyphus immutabilis* (T 1979)
"*Helotium*" *lividofuscum* K. S. Thind & S. S. Saini 灰褐柔膜菌 (Zang 1983)
"*Helotium*" *pallescens* (Pers.) Fr. 苍白柔膜菌 (T 1979)
Helotium serotinum (Pers.) Fr. = *Lanzia serotina* (T 1979)
Helotium subpallidum (Rehm) Velen. = *Bisporella subpallida* (T 1979)
Helotium subserotinum (P. Henn. & Nyl.) Dennis = *Dicephalospora rufocornea* (T 1979)
"*Helotium*" *yunnanense* S. H. Ou 云南柔膜菌 (T 1979)
Helvella acetabula (L.) Quel. 碟状马鞍菌 (T 1979)
Helvella adhaerens Peck = *Helvella elastica* (T 1979)
Helvella albella Quel. 白柄马鞍菌 (T 1979)
Helvella albipes Fuckel = *Helvella albella* (T 1979)
Helvella atra Oeder. 黑马鞍菌 (T 1979)
Helvella chinensis (Velen.) Nannf. & L. Holm 中华马鞍菌 (Lundell et al. 1985)
Helvella confusa Harmaja 混乱马鞍菌 (Z 1998)
Helvella corium (O. Weberb.) Massee 革马鞍菌 (T 1979)
Helvella costifera Nannf. 肋盖马鞍菌 (CF&L 1990b)
Helvella crispa Scop. : Fr. 皱马鞍菌 (T 1979)
Helvella elastica Bull. : Fr. 弹性马鞍菌 (T 1979)

Helvella ephippium Lev. 马鞍菌 (Cao 1988)
Helvella esculenta Pers. = *Gyromitra esculenta* (T 1979)
Helvella fargessii Pat. 法吉斯马鞍菌 (T 1979)
Helvella fusicarpa (W. R. Gerard) E. J. Durand = *Jafnea fusicarpa* (T 1979)
Helvella galeriformis B. Liu & J. Z. Cao 伞形马鞍菌 (L&C 1988)
Helvella glutinosa B. Liu & J. Z. Cao 粘马鞍菌 (L&C 1988)
Helvella helvellula (Durieu & Mont.) Dissing 小马鞍菌 (L&C 1988)
Helvella infula Schaeff. : Fr. = *Gyromitra infula* (T 1979)
Helvella jiaohensis J. Z. Cao, L. Fan & B. Liu 蛟河马鞍菌 (CF&L 1990b)
Helvella jilinensis J. Z. Cao, L. Fan & B. Liu 吉林马鞍菌 (CF&L 1990b)
Helvella lactea Boud. 乳白马鞍菌 (L&C 1988)
Helvella lacunosa Afzel. : Fr. 多洼马鞍菌 (T 1979)
Helvella leucopus Pers. 白腿马鞍菌 (Zhuang 1996)
Helvella leucomelaena (Pers.) Nannf. 黑白马鞍菌 (T 1979)
Helvella macropus (Pers. : Fr.) P. Karst. 粗柄马鞍菌 (T 1979)
Helvella maculata N. S. Weber 斑点马鞍菌 (L&C 1988)
Helvella nigrella (Seaver) F. L. Tai 黑褐马鞍菌 (T 1979)
Helvella oblongispora Harmaja 长孢马鞍菌 (CF&L 1990b)
Helvella pallescens Schaeff. = *Helvella crispa* (T 1979)
Helvella pezizoides Afzel. : Fr. 盘状马鞍菌 (LD&C 1985)
Helvella philonotis Dissing 喜湿马鞍菌 (Z&W 1998)
Helvella phlebophora Pat. & Doass. 脉马鞍菌 (L&C 1988)
Helvella pulla Holmsk. : Fr. = *Helvella elastica* (T 1979)
Helvella purpurea (M. Zang) B. Liu & J. Z. Cao = *Otidea purpurea* (Zang 1979, LD&C 1985)
Helvella rivularis Dissing & Sivertsen 槽马鞍菌 (CF&L 1990b)
Helvella sinensis B. Liu & J. Z. Cao 中国马鞍菌 (LD&C 1985)
Helvella solitaria (P. Karst.) P. Karst. 独生马鞍菌 (T 1979)
Helvella subfusispora B. Liu & J. Z. Cao 亚梭孢马鞍菌 (LD&C 1985)
Helvella sulcata Afzel. : Fr. = *Helvella lacunosa* (T 1979, Dissing 1966)
Helvella taiyuanensis B. Liu, F. Du & J. Z. Cao = *Helvella solitaria* (LD&C 1985)
Helvella xinjiangensis J. Z. Cao, L. Fan & B. Liu 新疆马鞍菌 (CF&L 1990b)
Helvella zhongtiaoensis J. Z. Cao & B. Liu 中条马鞍菌 (C&L 1990)
Hemiglossum yunnanense Pat. 假地舌菌 (T 1979)
Heyderia abietis (Fr.) Link 小顶盘菌 (Z&W 1998)
Humaria chinensis Bres. 中华土盘菌 (T 1979)
Humaria hemisphaerica (Wigg. : Fr.) Fuckel 半球土盘菌 (T 1979)
Humaria leucoloma Quel. ? = *Octospora leucoloma* (T 1979)
Humaria potaninii P. Karst. 肉色土盘菌 (T 1979)
Humaria rubens Boud. 红土盘菌 (T 1979)
Humaria semiimmersa (P. Karst.) Sacc. 半埋土盘菌 (T 1979)
Humaria subhepatica Rehm 肝色土盘菌 (T 1979)
Humaria testacea Schroet. 壳状土盘菌 (T 1979)
Humaria xylariicola P. Henn. & Nyl. 炭角生土盘菌 (T 1979)
Hyaloscypha albohyalina (P. Karst.) Boud. 白晶杯菌 (Z 1995)

Hyaloscypha aureliella (Nyl.) Huhtinen 黄脂晶杯菌 (Z 1995)
Hydnobolites cerebriformis Tul. & C. Tul. 粪粒块菌 (Zhang 1990)
Hydnotrya cerebriformis Harkn. 脑状腔块菌 (Zhang 1990)
Hydnotrya michaelis (E. Fisch.) Trappe 米氏腔块菌 (Zhang 1990)
Hydnotrya tulasnei (Berk.) Berk. & Broome 腔块菌 (Zhang 1990)
Hymenoscyphus caudatus (P. Karst.) Dennis 尾膜盘菌 (Z&K 1989, Z 1995)
Hymenoscyphus calyculus (Sowerby : Fr.) W. Phillips 小膜盘菌 (Dennis 1956, WW&Z 1996)
Hymenoscyphus eburneus (Roberge) W. Phillips 象牙膜盘菌 (K&Z 1985)
Hymenoscyphus epiphyllus (Pers. : Fr.) Rehm 叶生膜盘菌 (T 1979, Z 1995)
Hymenoscyphus friesii (Weinm.) Arendh. 弗里斯膜盘菌 (T 1979, Arendholdz 1979)
Hymenoscyphus fructigenus (Bull.) W. Phillips 栎果膜盘菌 (T 1979)
Hymenoscyphus immutabilis (P. Karst.) Dennis 难变膜盘菌 (T 1979, Dennis 1964)
Hymenoscyphus lasiopodium (Pat.) Dennis 毛柄膜盘菌 (Z&W 1998)
Hymenoscyphus phyllogenon (Rehm) Kuntze 叶产膜盘菌 (Z 1995)
Hymenoscyphus repandus (W. Phillips) Dennis 波状膜盘菌 (WW&Z 1996)
Hymenoscyphus sclerogenus (Berk. & M. A. Curtis) Dennis 硬膜盘菌 (K&Z 1985)
Hymenoscyphus scutulus (Pers. : Fr.) W. Phillips 盾膜盘菌 (Z 1995)
Hymenoscyphus scutulus var. *fucatus* W. Phillips 盾膜盘菌双极毛变种 (Z 1995)
Hymenoscyphus scutulus var. *solani* (P. Karst.) S. Ahmad 盾膜盘菌茄变种 (K&Z 1985)
Hymenoscyphus vernus (Boud.) Dennis 春膜盘菌 (WW&Z 1996)
Hypoderma commune (Fr.) Duby 皮下盘菌 (T 1979)
Hypoderma cunninghamiae Teng 杉皮下盘菌 (T 1979)
Hypoderma desmazieresii Duby = *Meloderma desmazieresii* (T 1979)
Hypoderma handelii Petrak = *Ploioderma handelii* (T 1979)
Hypodermella laricis Tubeuf 落叶松小皮下盘菌 (T 1979)
Iodophanus carneus (Pers.) Korf 肉质碘光盘菌 (Liou & Chen 1977a)
Iodophanus durbanensis (Biji) Kimbr. 德班碘光盘菌 (Liou & Chen 1977a)
Iodophanus granulipolaris Kimbr. 极粒碘光盘菌 (Wang 1995)
Iodophanus verrucosporus (Graff) Kimbr. 疣孢碘光盘菌 (WW&Z 1996)
Ionomidotis frondosa (Kobayasi) Kobayasi & Korf 复聚盘菌 (LC&Z 1988, Z 1988)
Jafnea fusicarpa (W. R. Gerard) Korf 南费盘菌 (T 1979, Z 1995)
Jafnea semitosta (Berk. & M. A. Curtis) Korf 半梭孢南费盘菌 (Z 1997)
Jafneadelphus ferrugineus (W. Phillips) Rifai subsp. *imaii* (Korf) Rifai = *Aleurina imaii* (K&Z 1985)
Kompsoscypha watertsonii (Seaver) Pfister 沃氏艳丽盘菌 (Z&W 1997)
Lachnellula dabaensis W. Y. Zhuang 大巴长生盘菌 (Z 1997)
Lachnellula fuscosanguinea (Rehm) Dennis 棕红长生盘菌 (WW&Z 1996)
Lachnellula subtilissima (Cooke) Dennis 梭孢长生盘菌 (WW&Z 1996)
Lachnum abnorme (Mont.) J. H. Haines & K. P. Dumont 异常粒毛盘菌 (T 1979, K&Z 1985)
Lachnum attenuatum J. H. Haines & K. P. Dumont 渐狭粒毛盘菌 (WW&Z 1996)
Lachnum brasiliense (Mont.) J. H. Haines & K. P. Dumont 巴西粒毛盘菌 (Haines & Dumont 1984)
Lachnum calosporum (Pat. & Gaillard) J. H. Haines & K. P. Dumont 美粒毛盘菌 (Z&W 1998)
Lachnum ciliare (Schrad. : Fr.) Rehm 毛粒毛盘菌 (K&Z 1985)

Lachnum flavidulum (Rehm) J. H. Haines 黄粒毛盘菌 (K&Z 1985)
Lachnum hainanense W. Y. Zhuang & Z. Wang 海南粒毛盘菌 (Z&W 1998a)
Lachnum indicum (E. K. Cash) J. H. Haines & K. P. Dumont 印度粒毛盘菌 (Haines & Dumont 1984)
Lachnum javanicum (P. Henn. & Nyl.) J. H. Haines, Korf & W. Y. Zhuang 爪哇粒毛盘菌 (T 1979, K&Z 1985)
Lachnum kumaonicum (M. P. Sharma) M. P. Sharma 库蒙粒毛盘菌 (Z 1989)
Lachnum lushanense W. Y. Zhuang & Z. Wang 庐山粒毛盘菌 (Z&W 1998)
Lachnum nudipes (Fuckel) Nannf. 裸粒毛盘菌 (Liou & Chen 1977, K&Z 1985)
Lachnum oncospermatis (Berk. & Broome) Sacc. 瘤状粒毛盘菌 (WW&Z 1996)
Lachnum pteridophyllum (Rodway) Spooner 蕨粒毛盘菌 (WW&Z 1996)
Lachnum pudibundum (Quel.) J. Schroet. 耻粒毛盘菌 (Z 1997)
Lachnum pygmaeum (Fr. : Fr.) Bres. 根粒毛盘菌 (K&Z 1985)
Lachnum sclerotii (A. L. Sm.) J. H. Haines & K. P. Dumont 斯氏粒毛盘菌 (Z 1989)
Lachnum singerianum (Dennis) W. Y. Zhuang & Z. Wang 辛格粒毛盘菌 (Z&W 1998a)
Lachnum tenuissimum (Quel.) Korf & W. Y. Zhuang 瘦粒毛盘菌 (K&Z 1985)
Lachnum virgineum (Batsch : Fr.) P. Karst. 洁白粒毛盘菌 (T 1979, K&Z 1985)
Lagerheima carteri (Berk.) Sacc. 卡特黑心盘菌 (T 1979)
Lambertella aurantiaca J. P. Tewari & D. C. Pant 橙色兰伯盘菌 (Z 1990)
Lambertella buchwaldii J. P. Tewari & Ram N. Singh 布氏兰伯盘菌 (K&Z 1985)
Lambertella copticola Korf & J. P. Tewari 黄连生兰伯盘菌 (K&Z 1985)
Lambertella corni-maris Hohn. 兰伯盘菌 (K&Z 1985)
Lambertella fructicola K. P. Dumont 实生兰伯盘菌 (Z 1991)
Lambertella guizhouensis W. Y. Zhuang & Korf 贵州兰伯盘菌 (Z&K 1987)
Lambertella himalayensis J. P. Tewari & D. C. Pant 喜马兰伯盘菌 (Z 1995)
Lambertella jasmini Seaver, Whetzel & K. P. Dumont 茉莉兰伯盘菌 (Z 1990a)
Lambertella korfii W. Y. Zhuang 柯夫兰伯盘菌 (Z 1990a)
Lambertella rubi Korf & W. Y. Zhuang 悬钩子兰伯盘菌 (K&Z 1985a)
Lambertella tewarii K. P. Dumont 台氏兰伯盘菌 (Z 1989, 1990a)
Lambertella torquata W. Y. Zhuang 环孢兰伯盘菌 (Z 1995a)
Lambertella verrucosispora W. Y. Zhuang 疣孢兰伯盘菌 (Z 1990a)
Lambertella xishuangbanna W. Y. Zhuang 西双版纳兰伯盘菌 (Z 1990a)
Lambertella zeylanica K. P. Dumont 锡兰兰伯盘菌 (K&Z 1985)
Lamprospora constellatio (Berk. & Broome) Seaver = *Pulvinula constellatio* (T 1979)
Lamprospora haemastigma (Hedw. : Fr.) Seaver = *Pulvinula convexella* (T 1979)
Lamprospora polytrichina (Rehm) Seaver 小孢齿盘菌 (T 1979)
Lamprospora wisconsinensis Seaver = *Pulvinula laeterubra* (T 1979)
Lanzia glandicola (K. S. Thind & H. Singh) K. P. Dumont var. *cornicola* W. Y. Zhuang 栎实兰斯盘菌灯台树变种 (Z 1996)
Lanzia huangshanica W. Y. Zhuang & Korf 黄山兰斯盘菌 (Z 1995b)
Lanzia huangshanica forma *aurantiaca* W. Y. Zhuang 黄山兰斯盘菌橙色变型 (Z 1995b)
Lanzia microserotina W. Y. Zhuang 小晚兰斯盘菌 (Z 1996a)
Lanzia phaeoparaphysis W. Y. Zhuang 暗丝兰斯盘菌 (Z 1995)
Lanzia rufocornea (Berk. & Broome) K. P. Dumont = *Dicephalospora rufocornea* (K&Z 1985)

Lanzia serotina (Pers. : Fr.) Korf & W. Y. Zhuang 晚生兰斯盘菌 (K&Z 1985)
Lasiobolus cuniculi Velen. 穴尖毛盘菌 (Wang 1995)
Lasiobolus microsporus J. L. Bezerra & Kimbr. 小孢尖毛盘菌 (Wang 1993)
Leotia atrovirens Pers. 黑绿锤舌菌 (T 1979)
Leotia aurantipes (S. Imai) F. L. Tai 黄柄锤舌菌 (T 1979)
Leotia castanea Teng 栗色锤舌菌 (T 1979)
Leotia gelatinosa Hill. 胶质锤舌菌 (Zang 1983)
Leotia gracilis F. L. Tai 细丽锤舌菌 (T 1979)
Leotia kunmingensis F. L. Tai 昆明锤舌菌 (T 1979)
Leotia lubrica (Scop.) Pers. 润滑锤舌菌 (T 1979)
Leotia marcida Pers. 凋萎锤舌菌 (Zang 1983)
Leotia portentosa (S. Imai & Minak) F. L. Tai 奇异锤舌菌 (T 1979)
Leptokalpion albicans Brumm. 白瘦盘菌 (Wang 1996)
Lirula macrospora (R. Hartig) Darker 大孢沟盘菌 (LT&L 1993)
Lirula nervisequia (DC. : Fr.) Darker 脉生沟盘菌 (T 1979)
Lophodermium anhuiense Y. R. Lin 安徽散斑壳 (Lin & Tang 1988)
Lophodermium autumnale Darker 秋散斑壳 (LLL&Y 1995)
Lophodermium arundinaceum (Schrad.) Chevall. 苇散斑壳 (T 1979)
Lophodermium australe Dearn. 南方散斑壳 (Lin & Tang 1988)
Lophodermium cedrinum Maire 雪松散斑壳 (LLL&Y 1995)
Lophodermium confluens Y. R. Lin, C. L. Hou & W. F. Zheng 连合散斑壳 (LHC&L 1995)
Lophodermium conigenum (Brunaud) Hilitzer 针叶树散斑壳 (Lin & Tang 1988)
Lophodermium ellipticum Y. R. Lin 椭圆散斑壳 (LL&T 1992)
Lophodermium filiforme Darker = *Lirula macrospora* (T 1979)
Lophodermium guangxiense Y. R. Lin 广西散斑壳 (LL&T 1993)
Lophodermium harbinense Y. R. Lin 哈尔滨散斑壳 (LLL&Y 1995)
Lophodermium himalayense P. F. Cannon & Minter 喜马拉雅散斑壳 (LL&T 1992)
Lophodermium indianum S. Singh & Minter 印度散斑壳 (LL&T 1992)
Lophodermium juniperinum (Fr. : Fr.) De Not. 刺柏散斑壳 (T 1979)
Lophodermium kumaunicum Minter & P. M. Sharma 库曼散斑壳 (LL&T 1992)
Lophodermium laricinum Duby 落叶松散斑壳 (LL&T 1993)
Lophodermium maximum B. Z. He & D. Q. Yang 大散斑壳 (He et al. 1986)
Lophodermium mirabile Y. R. Lin 奇异散斑壳 (L&T 1988)
Lophodermium nitens Darker 光亮散斑壳 (He et al. 1986)
Lophodermium orientale Minter 东方散斑壳 (LL&T 1993)
Lophodermium parasiticum B. Z. He & D. Q. Yang 寄生散斑壳 (He et al. 1986)
Lophodermium petrakii Durrieu 佩氏散斑壳 (LLL&Y 1995)
Lophodermium piceae (Fuckel) Hohn. 云杉散斑壳 (T 1979)
Lophodermium pieridis Keissl. 马醉木散斑壳 (T 1979)
Lophodermium pinastri (Schrad. : Fr.) Chevall. 松针散斑壳 (T 1979)
Lophodermium pini-bungeanae Y. R. Lin 白皮松散斑壳 (Lin & Tang 1988)
Lophodermium pini-excelsae S. Ahmad 乔松散斑壳 (He et al. 1986)
Lophodermium pini-pumilae Sawada 偃松散斑壳 (He et al. 1986)
Lophodermium pini-sibiricum C. L. Hou & S. Q. Liu 西伯利亚红松散斑壳 (Hou & Liu 1992)

Lophodermium rhododendri Ces. 杜鹃散斑壳 (T 1979)
Lophodermium seditiosum Minter, Staley & Millar 扰乱散斑壳 (He et al. 1985)
Lophodermium sichuanense D. X Qiu & T. G. Liu 四川散斑壳 (Liu & Qiu 1995)
Lophodermium staleyi Minter 斯塔雷散斑壳 (LHC&L 1995)
Lophodermium uncinatum Darker 杉叶散斑壳 (T 1979)
Lophodermium yanglingense Z. M. Cao & C. M. Tian 杨陵散斑壳 (CY&T 1994)
Lophophacidium hyperboreum Lagerb. 顶裂盘菌 (Liu et al. 1992)
Melastiza chateri (G. W. Sm.) Boud. 弯毛盘菌 (T 1979)
Melastiza rubra (L. R. Batra) Maas Geest. 红弯毛盘菌 (K&Z 1985)
Meloderma desmazieresii (Duby) Darker 黑皮盘菌 (T 1979, LT&L 1993)
Microglossum atropurpureum (Batsch : Fr.) P. Karst. 紫黑小舌菌 (T 1979)
Microglossum capitatum F. L. Tai = *Microglossum longisporum* (T 1979)
Microglossum fumosum (Peck) E. J. Durand 烟色小舌菌 (T 1979)
Microglossum longisporum E. J. Durand 长孢小舌菌 (T 1979, Z&W 1997)
Microglossum olivaceum (Pers.) Gillet 棕绿小舌菌 (T 1979)
Microglossum partitum Pat. 裂小舌菌 (Zang 1983)
Microglossum rufum (Schwein.) Underw. 红棕小舌菌 (T 1979)
Microglossum tetrasporum F. L. Tai = *Microglossum longisporum* (T 1979, Z&W 1997)
Micropyxis geoglossi (Ellis & Everh.) Seeler = *Gelatinopsis geoglossi* (K&Z 1985)
Microstoma aggregatum Y. Otani 聚生小口盘菌 (Z&W 1997)
Microstoma floccosum (Schwein.) Raitv. 白毛小口盘菌 (T 1979, Z&K 1989)
Microstoma floccosum var. *macrosporum* Y. Otani 白毛小口盘菌大孢变种 (Z&W 1997)
Midotis versiformis (Pers.) Seaver = *Chlorencoelia versiformis* (T 1979)
Mitrula bicolor Pat. (? = *Microglossum* sp.) 二色地杖菌 (T 1979, Z&W 1997)
Mitrula paludosa Fr. 湿生地杖菌 (T 1979)
Mitrula sclerotiorum Rostr. = *Episclerotium sclerotiorum* (T 1979)
Mitrula shiraiana (P. Henn.) S. Ito & S. Imai = *Scleromitrula shiraiana* (T 1979)
Moellerodiscus lentus (Berk. & Broome) K. P. Dumont 迈勒盘菌 (Z 1991)
Mollisia cinerea (Batsch) P. Karst. 灰软盘菌 (T 1979)
Mollisia viridulo-mellea Penz. & Sacc. 黄绿软盘菌 (T 1979)
Monilinia ariae (Schellenb.) Whetzel 花楸链核盘菌 (T 1979)
Monilinia fructicola (G. Winter) Honey 果生链核盘菌 (T 1979)
Monilinia fructigena Honey 果产链核盘菌 (T 1979)
Monilinia johnsonii (Ellis & Everh.) Honey 约翰逊链核盘菌 (Jing et al. 1982)
Monilinia laxa (Aderh. & Ruhland) Honey 核果链核盘菌 (T 1979)
Monilinia mali (Takah) Whetzel 苹果链核盘菌 (T 1979, Zang 1983)
Monilinia oxycocci (Woronin) Honey 酸果蔓链核盘菌 (T 1979, Z 1996)
Moravecia calospora Benkert, Caillet & Moyne 毛氏盘菌 (WW&Z 1996)
Morchella angusticeps Peck 小顶羊肚菌 (T 1979)
Morchella angusticeps var. *ovoideo-brunnea* C. J. Mou 小顶羊肚菌卵褐变种 (Mou 1987)
Morchella conica Pers. 尖顶羊肚菌 (T 1979)
Morchella crassipes (Vent.) Pers. 粗柄羊肚菌 (T 1979)
Morchella deliciosa Fr. 小羊肚菌 (T 1979)
Morchella distans Fr. 开裂羊肚菌 (T 1979)

Morchella elata Fr. 高羊肚菌 (T 1979)
Morchella esculenta (L.) Pers. 羊肚菌 (T 1979)
Morchella purpurascens Jacquet. 变紫羊肚菌 (Dai & Li, 1994)
Morchella rigida Krombh. 硬羊肚菌 (T 1979)
Morchella tibetica M. Zang 西藏羊肚菌 (Zang 1987)
Myriodiscus sparassoides Boedijn 胶莓盘菌 (T 1979, Liu & Guo 1986)
Nanoscypha macrospora Denison 大孢小杯菌 (Z&W 1997)
Nanoscypha pulchra Denison 美丽小杯菌 (K&Z 1985)
Neobulgaria pura (Fr.) Petrak 新胶鼓菌 (T 1979, WW&Z 1996)
Neocudoniella albiceps (Peck) Korf 新小地锤 (Liu 1990)
Neournula helvelloides (Donadini et al.) W. Y. Zhuang 马鞍状新深杯菌 (Z&W 1998b)
Nothomitra sinensis W. Y. Zhuang 中国假地杖菌 (Z&W 1997)
Ocellaria ocellata (Pers.) J. Schroet. 眼斑盘菌 (T 1979, Dennis 1968)
Octospora leucoloma Hedw. 八孢盘菌 (T 1979, Dennis 1968, WW&Z 1996)
Orbicula parietina (Schrad.) Hughes 球盘菌 (LC&L 1987)
Orbilia auricolor (Bloxam ex Berk. & Broome) Sacc. 金色圆盘菌 (K&Z 1985)
Orbilia curvatispora Boud. 弯孢圆盘菌 (Z&K 1989)
Orbilia cf. *fimicola* Jeng & J. C. Krug 粪生圆盘菌 (Z&W 1998a)
Orbilia inflatula (P. Karst.) P. Karst. 肿丝圆盘菌 (Z 1989)
Orbilia sinuosa Penz. & Sacc. 波缘圆盘菌 (T 1979)
Orbilia xanthostigma (Fr. : Fr.) Fr. 黄色圆盘菌 (K&Z 1985)
Otidea alutacea (Pers.) Massee 革侧盘菌 (CF&L 1990)
Otidea alutacea var. *microspora* Kanouse 革侧盘菌小孢变种 (CF&L 1990)
Otidea bufonia (Pers.) Boud. 褐侧盘菌 (CF&L 1990)
Otidea cochleata (L. : Fr.) Fuckel 耳侧盘菌 (CF&L 1990)
Otidea concinna (Pers.) Sacc. 优雅侧盘菌 (T 1979)
Otidea daliensis W. Y. Zhuang & Korf 大理侧盘菌 (Z&K 1989)
Otidea grandis (Pers.) Massee 大侧盘菌 (Z&W 1998)
Otidea lactea J. Z. Cao & L. Fan 乳白侧盘菌 (CF&L 1990)
Otidea leporina (Batsch : Fr.) Fuckel 兔耳状侧盘菌 (T 1979)
Otidea leporina var. *minor* Rehm 兔耳状侧盘菌小孢变种 (T 1979)
Otidea olivacea J. Z. Cao & L. Fan 橄榄绿侧盘菌 (CF&L 1990)
Otidea onotica (Pers.) Rehm 驴耳状侧盘菌 (CF&L 1990)
Otidea propinquata (P. Karst.) Harmaja 邻侧盘菌 (CF&L 1990)
Otidea purpurea (Zang) Korf & W. Y. Zhuang 紫侧盘菌 (Zang 1979, LD&C 1985, K&Z 1985)
Otidea sinensis J. Z. Cao & L. Fan 中华侧盘菌 (CF&L 1990)
Otidea tianshuiensis J. Z. Cao & L. Fan 天水侧盘菌 (CF&L 1990)
Otidea tuomikoskii Harmaja 托氏侧盘菌 (CF&L 1990)
Otidea umbrina (Pers. : Fr.) Bres. 赭色侧盘菌 (Zang 1983)
Otideopsis kaushalii (J. Moravec) J. Moravec 考氏假地耳 (Z&K 1987, J. Moravec 1988)
Otideopsis yunnanensis B. Liu & J. Z. Cao 假地耳 (L&C 1987)
Pachyphloeus citrinus Berk. & Broome 橙色粗皮块菌 (Zhang 1990)
Pachyphloeus virescens Gilkey 变绿粗皮块菌 (Zhang 1990)
Patellaria atrata (Hedw.) Fr. 黑胶皿菌 (T 1979)

Patellaria carestinae De Not. 小孢胶皿菌 (T 1979)
Patellaria tetraspora Massee & Morgan 四孢胶皿菌 (T 1979)
Pezicula aurantiaca Rehm 橙黄无柄盘菌 (T 1979)
Pezicula ocellata (Pers.) Seaver = *Ocellaria ocellata* (T 1979)
Pezicula subcarnea J. W. Groves 近肉色无柄盘菌 (Liou & Chen 1977)
Peziza abietina Pers. 冷杉盘菌 (T 1979)
Peziza ampelioa Quel. 藤盘菌 (Chang & Mao 1995)
Peziza ampliata Pers. 茎盘菌 (T 1979)
Peziza arvernensis Boud. 阿地盘菌 (T 1979, Hohmeyer 1986)
Peziza atrospora Fuckel 暗孢盘菌 (K&Z 1985)
Peziza atrovinosa Cooke & W. R. Gerard 暗葡萄酒色盘菌 (T 1979)
Peziza badia Pers. 纹孢盘菌 (T 1979)
Peziza brunneoatra Desm. 棕黑盘菌 (T 1979)
Peziza celcita (Boud.) M. M. Moser 紫红盘菌 (Wang 1996a)
Peziza cerea Sowerby 蜡质盘菌 (T 1979)
Peziza convoluta Peck 卷旋盘菌 (T 1979)
Peziza echinospora P. Karst. 刺孢盘菌 (WW&Z 1996)
Peziza elachroa Berk. & M. A. Curtis 小盘菌 (Wang 1996a)
Peziza emileia Cooke 疣孢盘菌 (Z 1996)
Peziza fimeti (Fuckel) Seaver 粪生盘菌 (K&Z 1985)
Peziza michelii (Boud.) Dennis 米氏盘菌 (K&Z 1985)
Peziza micropus Pers. 小柄盘菌 (WW&Z 1996)
Peziza moravecii (Svrcek) Donadini 毛氏盘菌 (Wang 1996a)
Peziza petersii Berk. & M. A. Curtis 皮氏盘菌 (WW&Z 1996, Hohmeyer 1986)
Peziza phyllogena Cooke 叶生盘菌 (Z 1998)
Peziza praetervisa Bres. = *Peziza petersii* (WW&Z 1996)
Peziza repanda Pers. 波缘盘菌 (T 1979)
Peziza cf. *saccardiana* Cooke 撒卡多盘菌 (Z&K 1989)
Peziza sepiatra Cooke 褐盘菌 (T 1979)
Peziza subumbrina Boud. 亚暗色盘菌 (K&Z 1985)
Peziza succosa Berk. 多汁盘菌 (Z 1996)
Peziza succosella (Le Gal & Romagn.) M. M. Moser 小多汁盘菌 (K&Z 1985)
Peziza sylvestris (Boud.) Sacc. & Trotter = *Peziza arvernensis* (T 1979)
Peziza thozetii Berk. 托塞盘菌 (K&Z 1985)
Peziza varia (Hedw.) Fr. 变异盘菌 (WW&Z 1996)
Peziza vesiculosa Bull. 泡质盘菌 (T 1979)
Peziza violacea Pers. 紫色盘菌 (T 1979)
Phacidium repandum (Alb. & Schwein.) Rehm 浅波状星裂盘菌 (T 1979)
Phialea cyathoidea (Bull. : Fr.) Gillet = *Crocicreas cyathoideum* (T 1979)
Phialea delavayi Pat. (?= *Lanzia* sp.) 褐红小杯菌 (T 1979, Carpenter 1981)
Phialea delavayi forma major Pat. (?= *Bisporella* sp.) 褐红小杯菌大型变型 (T 1979, Carpenter 1981)
Phialea myricariae Keissl. (?= *Lambertella* sp.) 水柏枝小杯菌 (T 1979, Carpenter 1981)
Phillipsia carnicolor Le Gal 肉色歪盘菌 (Z&W 1997)

Phillipsia costaricensis Denison 哥地歪盘菌 (WW&Z 1996, W 1997a)
Phillipsia crispata (Berk. & M. A. Curtis) Le Gal 卷歪盘菌 (Z&W 1997)
Phillipsia domingensis Berk. 多地歪盘菌 (T 1979)
Phillipsia gigantea Seaver 巨歪盘菌 (Liu 1990)
Phillipsia inaequalis (Berk. & M. A. Curtis) Le Gal 橙色歪盘菌 (T 1979)
? *Phillipsia subpurpurea* Berk. & Broome 近紫歪盘菌 (T 1979, Z&W 1997)
Picoa carthusiana Tul. & C. Tul. 梭孢皮考块菌 (Liu & Tao 1990)
Pithya crupressi (Batsch : Fr.) Rehm 柏小艳盘菌 (T 1979)
Plectania campylospora (Berk.) Nannf. 弯孢暗盘菌 (T 1979, Korf 1957)
Plectania melastoma (Sowerby : Fr.) Fuckel 暗盘菌 (T 1979, Korf 1957)
Plectania nigrella (Pers. : Fr.) P. Karst. 球孢暗盘菌 (Teng 1963, Z&W 1998b)
Plectania platensis (Speg.) Rifai 普拉塔暗盘菌 (Z 1989)
Plectania yunnanensis W. Y. Zhuang 云南暗盘菌 (Z&W 1998b)
Ploioderma pini-armandi C. L. Hou & S. Q. Liu 华山松舟皮盘菌 (Hou & Liu 1993)
Ploioderma handelii (Petrak) Y. R. Lin & C. L. Hou 汉德尔舟皮盘菌 (T 1979, Lin & Hou 1994)
Ploioderma destruens Y. R. Lin & C. L. Hou 毁坏舟皮盘菌 (Lin & Hou 1995)
Polydesmia pruinosa (Berk. & Broome) Boud. 多丝盘菌 (WW&Z 1996)
Proliferodiscus inspersus (Berk. & M. A. Curtis) J. H. Haines & K. P. Dumnot var. *magniascus* W. Y. Zhuang 层出盘菌大子囊变种 (Z 1989)
Pseudohelotium quercinum Keissl. 栎假柔膜菌 (T 1979)
Pseudombrophila deerata (P. Karst.) Seaver = *Pseudombrophila merdaria* (WW&Z 1996)
Pseudombrophila merdaria (Fr.) Brumm. 粪假雨盘菌 (WW&Z 1996, Brummelen 1995)
Pseudopeziza komarovii Jacz. 茜草假盘菌 (T 1979)
Pseudopeziza medicaginis (Lib.) Sacc. 苜蓿假盘菌 (T 1979)
Pseudopeziza radians (Roberge & Desm.) Sacc. 光亮假盘菌 (T 1979)
Pseudopeziza trifolii (Biv.) Fuckel 车轴草假盘菌 (T 1979)
Pseudopithyella minuscula (Boud. & Torrend) Seaver 假微艳盘菌 (K&Z 1985)
Pseudoplectania nigrella (Pers.) Fuckel 假暗盘菌 (T 1979)
Pseudoplectania vogesiaca (Pers.) Seaver 卷边假暗盘菌 (T 1979)
Pseudorhizina sphaerospora (Peck) Pouzer 球孢假鹿花菌 (Cao & Zhu 1992)
Psilachnum chrysostigmum (Fr. : Fr.) Raitv. 金点短毛盘菌 (K&Z 1985)
Psilachnum microallantosporum Korf & W. Y. Zhuang 小蕉孢短毛盘菌 (K&Z 1985)
Psilopezia aquatica (Lam. : Fr.) Rehm 水生滑盘菌 (T 1979)
Psilopezia dabaensis W. Y. Zhuang 大巴滑盘菌 (Z 1997)
Psilopezia flavida Berk. & M. A. Curtis 黄滑盘菌 (T 1979)
Psilopezia juruensis P. Henn. 耶地滑盘菌 (WW&Z 1996)
Pulvinula ascoboloides Korf & W. Y. Zhuang = *Boubovia ascoboloides* (K&Z 1984)
Pulvinula carbonaria (Fuckel) Boud. 炭垫盘菌 (WW&Z 1996)
Pulvinula constellario (Berk. & Broome) Boud. 短垫盘菌 (T 1979, Dennis 1978)
Pulvinula convexella (P. Karst.) Pfister 凸垫盘菌 (T 1979)
Pulvinula guizhouensis M. H. Liu 贵州垫盘菌 (Liu 1991)
Pulvinula laeterubra (Rehm) Pfister 富红垫盘菌 (T 1979, Pfister 1976)
Pulvinula minor M. H. Liu 小垫盘菌 (Liu 1991)
Pyrenopeziza medicagenis (L.) Fuckel 苜蓿埋盘菌 (T 1979)

Pyrenopeziza nigrella Pat. 黑埋盘菌 (T 1979)
Pyronema domestica (Sowerby) Sacc. 砖火丝菌 (T 1979)
Pyronema omphalodes (Bull.) Fuckel 烧土火丝菌 (T 1979)
Ramsbottomia crechqueraltii (P. Crouan) Benkert & T. Schumach. 刺孢赖姆氏盘菌 (Z 1995)
Rhizina inflata (Schaeff.) Sacc. 凸面根盘菌 (T 1979)
Rhizina undulata Fr. 波状根盘菌 (Zang 1983)
Rhytisma acerinum (Pers.) Fr. 槭斑痣盘菌 (T 1979)
Rhytisma himalense Syd. & Butler 喜马斑痣盘菌 (Zang 1983)
Rhytisma lonicericola P. Henn. 忍冬生斑痣盘菌 (T 1979)
Rhytisma punctatum (Pers.) Fr. 斑痣盘菌 (T 1979)
Rhytisma rhododendri Fr. 杜鹃斑痣盘菌 (T 1979)
Rhytisma rhododendri-oldhamii Sawada 直丝斑痣盘菌 (T 1979)
Rhytisma salicinum Fr. 柳斑痣盘菌 (T 1979)
Rutstroemia conformata (P. Karst.) Nannf. 同形蜡盘菌 (T 1979)
Rutstroemia dabaensis W. Y. Zhuang 大巴蜡盘菌 (Z 1997)
Rutstroemia sydowiana (Rehm) W. L. White 赛氏蜡盘菌 (T 1979, Z 1995)
Saccobolus citrinus Boud. & Torrend 黄集孢粪盘菌 (Liou & Chen 1977a)
Saccobolus depauperatus (Berk. & Broome) E. C. Hansen 小集孢粪盘菌 (Liou & Chen 1977a)
Saccobolus glaber (Pers.) Lambotte 光集孢粪盘菌 (Liou & Chen 1977a)
Saccobolus globuliferellus Seaver 球状集孢粪盘菌 (Liou & Chen 1977a)
Saccobolus infestans (Bat. & Pontual) Brumm. 致病集孢粪盘菌 (Wang, 1995)
Saccobolus michiganesis O'Donnell 密执安集孢粪盘菌 (Wang 1996)
Saccobolus minimus Velen. 微小集孢粪盘菌 (Liou & Chen 1977a)
Saccobolus saccoboloides (Seaver) Brumm. 似集孢粪盘菌 (Wang 1993)
Saccobolus succineus Brumm. 琥珀色集孢粪盘菌 (Wang 1995)
Saccobolus thaxteri Brumm. 萨氏集孢粪盘菌 (WW&Z 1996)
Saccobolus truncatus Velen.平截聚孢粪盘菌 (Liou & Chen 1977a, Z 1991)
Saccobolus verrucisporus Brumm. 疣孢集孢粪盘菌 (WW&Z 1996)
Sarcoleotia globosa (Sommerf. : Fr.) Korf 肉锤菌 (Z&W 1998)
Sarcoscypha cerebriformis W. Y. Zhuang & Z. Wang 脑孢肉杯菌 (W&Z 1996)
Sarcoscypha coccinea (Scop. : Fr.) Lambotte 肉杯菌 (T 1979)
Sarcoscypha floccosa (Schwein.) Sacc. = *Microstoma floccosum* (T 1979)
Sarcoscypha javensis Hohn. 爪哇肉杯菌 (Harrington & Potter 1997)
Sarcoscypha korfiana F. A. Harr. 柯夫肉杯菌 (Harrington 1997)
Sarcoscypha occidentalis (Schwein.) Sacc. 西方红肉杯菌 (T 1979)
Sarcoscypha occidentalis forma *citrina* W. Y. Zhuang = *Sarcoscypha korfiana* (Z 1993)
Sarcoscypha sherrifii Balf.-Browne ?= *Sarcoscypha coccinea* (Zang 1983)
Sarcoscypha striatispora W. Y. Zhuang 条孢肉杯菌 (Z 1991)
Sarcoscypha vassiljevae Raitv. 白色肉杯菌 (Z 1993)
Sarcosoma amurense Lj. N. Vass. = *Galiella amurensis* (T 1979)
Sarcosoma javanicum Rehm = *Galiella javanica* (T 1979)
Sarcosoma thwaitesii (Berk. & Broome) Petch = *Galiella thwaitesii* (T 1979)
Sarcosphaea coronaria (Jacq.) Boud. 冠裂球肉盘菌 (T 1979)
Scleromitrula shiraiana (P. Henn.) S. Imai 核地杖菌 (T 1979, Kohn & Nasagawa 1984)

Sclerotinia allii Sawada = *Ciborinia allii* (T 1979)
Sclerotinia arachidis Hanz. = *Botryotinia arachidis* (T 1979)
Sclerotinia asari Y. S. Wu & C. R. Wang 细辛核盘菌 (Wang & Wu 1983)
Sclerotinia ciborioides (Hoffm.) Noack = *Sclerotinia trifoliorum* (T 1979)
Sclerotinia fuckeliana (de Bary) Fuckel = *Botryotinia fuckeliana* (T 1979)
Sclerotinia ginseng C. R. Wang, C. F. Chen & J. Chen 人参核盘菌 (Wang et al. 1995)
Sclerotinia graminearum Elener. 禾核盘菌 (T 1979)
Sclerotinia mali Takah = *Monilinia mali* (T 1979)
Sclerotinia minor Jagger 小核盘菌 (T 1979)
Sclerotinia miyabeana Hanzawa 宫部核盘菌 (T 1979)
Sclerotinia moricola I. Hino = *Botryotinia moricola* (T 1979)
Sclerotinia nicotianae Oudem. & Koning 烟草核盘菌 (T 1979)
Sclerotinia sclerotiorum (Lib.) de Bary 核盘菌 (T 1979)
Sclerotinia trifoliorum Erikss. 三叶草核盘菌 (T 1979, Wang et al. 1992)
Scutellinia abundans (P. Karst.) Kuntze = *Trichophaea abundans* (T 1979)
Scutellinia ascoboloides (Bertero) Teng = *Cheilymenia theleboloides* (T 1979)
Scutellinia badioberbis (Berk. ex Cooke) Kuntze 栗色盾盘菌 (Zang 1983)
Scutellinia barlea (Boud.) Le Gal 疣球孢盾盘菌 (T 1979, Schumacher 1990)
Scutellinia colensoi Massee ex Le Gal 假网孢盾盘菌 (Liou & Chen 1977, Z&W 1998)
Scutellinia crinita (Bull. : Fr.) Lambotte 毛盾盘菌 (Z 1991, Z1994a)
Scutellinia decipiens Le Gal 阔孢盾盘菌 (WW&Z 1996)
Scutellinia erinaceus (Schwein. : Fr.) Kuntze 刺盾盘菌 (T 1979)
Scutellinia fimetaria (Seaver) Teng = *Scutellinia crinita* (T 1979)
Scutellinia fujianensis J. Z. Cao & J. Moravec 福建盾盘菌 (Cao & J. Moravec 1988)
Scutellinia hemisphaerica (Wigg. : Fr.) Kuntze = *Humaria hemisphaerica* (T 1979)
Scutellinia kerguelensis (Berk.) Kuntze 克地盾盘菌 (Z&K 1989)
Scutellinia lusatiae (Cooke) Kuntze = *Scutellinia olivascens* (T 1979)
Scutellinia minutella Svrcek & J. Moravec 小盾盘菌 (K&Z 1985)
Scutellinia nigrohirtula (Svrcek) Le Gal 黑毛盾盘菌 (WW&Z 1996)
Scutellinia olivascens (Cooke) Kuntze 橄榄盾盘菌 (T 1979, Schumacher 1990)
Scutellinia scutellata (L. : Fr.) Lambotte 盾盘菌 (T 1979)
Scutellinia setosa (Nees : Fr.) Kuntze 刚毛盾盘菌 (T 1979)
Scutellinia sinensis M. H. Liu 中国盾盘菌 (Liu & Peng 1996)
Scutellinia subcervorum Svrcek = *Scutellinia crinita* (K&Z 1985, Schumacher 1990)
Scutellinia subhirtella Svrcek 亚毛盾盘菌 (K&Z 1985)
Sepultaria arenicola (Lev.) Massee = *Geopora arenicola* (T 1979)
Sepultaria arenosa (Fuckel) Boud. = *Geopora arenicola* (T 1979)
Smardaea microspora J. Z. Cao, L. Fan & B. Liu 小孢紫盘菌 (CF&L 1990c)
Smardaea planchonis (Dunal ex Boud.) Korf & W. Y. Zhuang 平紫盘菌 (K&Z 1985, K&Z 1991)
Smardaea protea W. Y. Zhuang & Korf 变形紫盘菌 (Z&K 1989)
Smardaea purpurea Dissing 紫色紫盘菌 (CF&L 1990c)
Soleella cunninghamiae Saho & Zinno 杉木小鞋孢盘菌 (L&T 1991)
Soleella huangshanica C. L. Hou & H. S. Cao 黄山小鞋孢盘菌 (Hou et al. 1997)
Soleella pinicola Y. R. Lin & W. Ren 松生小鞋孢盘菌 (Lin & Ren 1992)

Sowerbyella fagicola J. Moravec 山毛榉索氏盘菌 (Z&W 1997)
Sowerbyella radiculata (Sowerby) Nannf. 根索氏盘菌 (WW&Z 1996, Z 1998)
Sowerbyella rhenana (Fuckel) J. Moravec 雷那索氏盘菌 (K&Z 1985, J. Moravec 1986)
Spathularia clavata (Schaeff.) Sacc. = *Spathularia flavida* (T 1979)
Spathularia flavida Pers. : Fr. 地勺菌 (T 1979)
Spathularia velutipes Cooke & Farl. = *Spathulariopsis velutipes* (Mao et al. 1993)
Spathulariopsis velutipes (Cooke & Farl.) Maas Geest. 拟地勺菌 (Mao et al. 1993, Maas Geesteranus 1972)
Sphaerospora hinnulea (Berk. & Broome) Massee = *Sphaerosporella hinnulea* (T 1979)
Sphaerospora trechispora (Berk. & Broome) Sacc. = *Scutellinia barlea* (T 1979)
Sphaerosporella hinnulea (Berk. & Broome) Rifai 木生小球孢盘菌 (T 1979, Rifai 1968)
Stictis albomarginata S. H. Ou 银边点盘菌 (T 1979)
Stictis hydrangeae Schwein. 八仙花点盘菌 (K&Z 1985)
Stictis radiata (L.) Pers. 放射点盘菌 (K&Z 1985)
Stictis stellata Wallr. 星状点盘菌 (WW&Z 1996)
Stromatinia pseudotuberosa Rehm ? = *Ciboria batschiana* (T 1979)
Stromatinia rapulum (Bull.) Boud. 座盘菌 (T 1979)
Tapesia hydrophila (P. Karst.) Rehm (?= *Mollisia* sp.) (WW&Z 1996)
Tarzetta catinus (Holmsk. : Fr.) Korf & J. K. Rogers 碗状疣杯菌 (Korf 1971, T 1979, Liu ed. 1991)
Tarzetta cupularis (L. : Fr.) Lambotte 杯状疣杯菌 (T 1979, Dennis 1978, Z&W 1997)
Terfezia arenaria (Morris) Trappe 地菇 (T 1979, Anon. 1991〕
Terfezia leonis (Tul. & C. Tul.) Tul. & C. Tul. = *Terfezia arenaria* (T 1979)
Terfezia spinosa Harkn. 刺孢地菇 (T 1979)
Terfezia terfezioides (Mattir.) Trappe 地菇状地菇 (Liu ed. 1991)
Thecotheus agranulosus Kimbr. 无粒锥盘菌 (Wang 1995)
Thecotheus flavidus Y. Z. Wang & Kimbr. 黄锥盘菌 (Wang & Kimbrough 1993)
Thecotheus formosanus Y. Z. Wang 台湾锥盘菌 (Wang 1994)
Thecotheus pelleteri (P. Crouan & H. Crouan) Boud. 锥盘菌 (Wang 1993)
Thelebolus stercoreus Tode 寡囊盘菌 (WW&Z 1996)
Torrendiella eucalypti (Berk.) Spooner 桉小托雷盘菌 (Z&W 1997)
Tricharina gilva (Boud.) Eckblad 黄薄毛盘菌 (Z&K 1989)
Trichoglossum cheliense F. L. Tai 景洪毛舌菌 (T 1979)
Trichoglossum confusum E. J. Durand 紊乱毛舌菌 (T 1979)
Trichoglossum durandii Teng 杜兰毛舌菌 (T 1979)
Trichoglossum farlowii (Cooke) E. J. Durand 法洛毛舌菌 (T 1979)
Trichoglossum farlowii var. *rotundiforme* (Kawamato) Teng 法洛毛舌菌圆形变种 (T 1979)
Trichoglossum geoglossoides W. Y. Zhuang 地舌状毛舌菌 (Z&W 1997)
Trichoglossum hirsutum (Pers. : Fr.) Boud. 毛舌菌 (T 1979)
Trichoglossum hirsutum var. *latisporum* W. Y. Zhuang 毛舌菌阔孢变种 (Z&W 1997)
Trichoglossum hirsutum var. *longisporum* (F. L. Tai) Mains 毛舌菌长孢变种 (T 1979)
Trichoglossum kunmingense F. L. Tai 昆明毛舌菌 (T 1979)
Trichoglossum octopartitum Mains 八段毛舌菌 (Z 1996)
Trichoglossum persoonii F. L. Tai 珀松毛舌菌 (T 1979)

Trichoglossum qingchengense W. Y. Zhuang 青城毛舌菌 (Z&W 1997)
Trichoglossum rasum Pat. 罕见毛舌菌 (T 1979)
Trichoglossum sinicum F. L. Tai 中国毛舌菌 (T 1979)
Trichoglossum tetrasporum Sinden & Fitzp. 四孢毛舌菌 (T 1979, Z&W 1997)
Trichoglossum tetrasporum var. *brevisporum* F. L. Tai = *Trichoglossum tetrasporum* (T 1979)
Trichoglossum variabile (E. J. Durand) Nannf. 变异毛舌菌 (T 1979)
Trichoglossum velutipes (Peck) E. J. Durand 绒柄毛舌菌 (T 1979)
Trichoglossum walteri (Berk.) E. J. Durand 沃尔特毛舌菌 (K&Z 1985)
Trichoglossum yunnanense F. L. Tai 云南毛舌菌 (T 1979)
Trichophaea abundans (P. Karst.) Boud. 茂长毛盘菌 (T 1979, Z&K 1989)
Trichophaea albospadicea (Grev.) Boud. 红白长毛盘菌 (T 1979)
Trichophaea geoporoides Korf & W. Y. Zhuang 地孔状长毛盘菌 (K&Z 1985)
Trichophaea gregaria (Rehm) Boud. 聚生长毛盘菌 (Z&K 1989)
Trichophaea pallidibrunnea W. Y. Zhuang & Korf 淡褐长毛盘菌 (Z&K 1989)
Trichophaea woolhopeia (Cooke & W. Phillips) Boud. 束长毛盘菌 (T 1979)
Trichophaeopsis bicuspis (Boud.) Korf & Erb 拟长毛盘菌 (Z&W 1997)
Trochila cinerea Pat. 灰皮裂盘菌 (T 1979)
Tuber borchii Vittad 包氏块菌 (Zhang 1990)
Tuber californicum Harkn. 加州块菌 (Zhang 1990)
Tuber foetidum Vittad 臭块菌 (Zhang 1990)
Tuber gigantosporum Y. Wang & Z. P. Li 巨孢块菌 (Wang & Li 1991)
Tuber himalayense B. C. Zhang & Minter 喜马拉雅块菌 (Zhang & Minter 1988)
Tuber nitidum Vittad 光果块菌 (Zhang 1990)
Tuber puberulum Berk. & Broome 绒毛块菌 (Zhang 1990)
Tuber sinense K. Tao & B. Liu 中国块菌 (Tao, Liu & Zhang 1989)
Tuber taiyuanense B. Liu 太原块菌 (Liu 1985)
Tuber texense Heimsch 德州块菌 (Zhang 1990)
Tympanis abietina J. W. Groves 冷杉芽孢盘菌 (Xiang & Song 1988)
Tympanis alnea (Pers.) Rehm 桤芽孢盘菌 (Xiang & Song 1988)
Tympanis alnea var. *hysterioides* Rehm 缝裂桤芽孢盘菌 (Xiang & Song 1988)
Tympanis confusa Nyl. 混杂芽孢盘菌 (Xiang & Song 1988)
Tympanis hainanensis S. H. Ou 海南芽孢盘菌 (T 1979)
Tympanis piceina J. W. Groves 云杉芽孢盘菌 (Xiang & Song 1988)
Tympanis pitya (Fr.) Sacc. 松芽孢盘菌 (Sun et al. 1983)
Tympanis spermatiospora (Nyl.) Nyl. 性孢芽孢盘菌 (Zang 1983)
Tympanis tiliae C. T. Xiang & R. Q. Song 椴芽孢盘菌 (Xiang & Song 1988)
Unguiculariopsis hysterigena (Berk. & Broome) Korf 皱裂菌拟爪毛盘菌 (K&Z 1985)
Unguiculariopsis ravenelii ssp. *hamata* (Chen.) W.Y. Zhuang 拉氏拟爪毛盘菌钩亚种 (Z 1988a)
Urnula campylospora (Berk.) Cooke = *Plectania campylospora* (T 1979)
Urnula createrium Fr. 浅脚瓶盘菌 (T 1979)
Urnula melastoma (Sowerby : Fr.) Boud. = *Plectania melastoma* (T 1979)
Verpa bohemica (Krombh.) Schroet. 波地钟菌 (T 1979)
Verpa conica (O. F. Mull.) Rehm 圆锥钟菌 (Liu ed. 1991)
Verpa digitaliformis Pers. 指状钟菌 (T 1979)

Vibrissea truncorum Fr. 水盘菌 (He 1988)
Wolfina oblongispora (J. Z. Cao) W. Y. Zhuang & Z. Wang 长孢沃尔夫盘菌 (Z&W 1998b)
Wynnea americana Thaxt. 美洲丛耳 (Z 1995)
Wynnea gigantea Berk. & M. A. Curtis 丛耳 (T 1979)
Wynnea gigantea var. *nana* Pat. 丛耳短柄变种 (T 1979)
Wynnea macrospora B. Liu & J. Z. Cao 大孢丛耳 (L&C 1987)
Wynnea sinensis B. Liu & J. Z. Cao = *Wynnea gigantia* (W 1997a)
Wynnella silvicola (Berk.) Nannf. 林生小丛耳 (Cao 1988)
Xeromedulla quercicola Korf & W. Y. Zhuang 栎干髓盘菌 (Z&K 1989)

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FIVE NEW SPECIES OF LECANORA FROM AUSTRALIA (LICHENIZED ASCOMYCOTINA; LECANORACEAE)

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Abstract: The new species *L. arafurensis* Lumbsch & Elix, *L. austrointumescens* Lumbsch & Elix, *L. contractuloides* Lumbsch & Elix, *L. mobergiana* Lumbsch & Elix, and *L. placodiolica* Lumbsch & Elix are described from Australia. *Lecanora arafurenesis, L. austrointumescens*, and *L. mobergiana* belong to *Lecanora sensu stricto*, while *L. contractuloides* is placed in the subgenus *Placodium* group, and *L. placodiolica* in the *L. varia* group.

The lichen genus *Lecanora* Ach. is well represented in Australia, with estimated totals of 73 and 105 taxa in recent overviews of the Australian lichen flora (Rogers and Hafellner, 1992; Filson, 1996). For several years we have studied the taxonomy of different groups of this genus in Australia (Lumbsch and Elix, 1993; Lumbsch, 1994, 1995; Lumbsch, Feige and Elix, 1994a,b, 1995; Dickhäuser, Lumbsch and Feige, 1995; Lumbsch, Guderley and Elix, 1996; Lumbsch et al., 1997). In connection with the FLORA OF AUSTRALIA project, we have discovered several new species in various groups. These are described below.

Methods

Microscopy. Thalli and apothecia were cut using a freezing microtome in sections 16-20 µm thick and stained with lactophenol cotton-blue.

Chemistry. The chemical constituents were identified using thin layer chromatography, TLC (Culberson 1972, Culberson et al. 1981, Culberson & Johnson 1982) and gradient-elution high performance liquid chromatography, HPLC (Feige et al. 1993).

Results and Discussion

1. **Lecanora arafurensis** Lumbsch & Elix, sp. nov.

(Figs 1-3)

Planta saxicola. Thallus verrucosus vel verruculosus, luteo-albidus usque ad albido-griseus. Soredia nulla. Prothallus albido-griseus. Apothecia sessilia, 0.3-0.7 mm in diametro, disci griseofusci vel rubrofusci, epruinosi. Margines apotheciorum verrucosi. Cortex hyalinus, inspersus, 20-35 µm. Amphithecium crystalla magna minutaque continens. Parathecium hyalinum, *ca.* 10-15 µm crassum. Epihymenium griseobrunneum vel rubrofuscum, granulosum. Hypothecium et subhymenium hyalinum. Asci clavati, octospori. Sporae hyalinae, late ellipsoideae, 7.5-11.0 x 4.5-7.0 µm. Thallus atranorinum, chloratranorinum, acidum stenosporonicum et acidum thiophanicum continens.

Type: Australia. Northern Territory, Stuart Hwy, 41 km NW of Pine Creek, 160 m, 13°36'S, 131°32'E, 18.7.1991, *H.T. Lumbsch 8829 m, J.A. Elix & H. Streimann* (CANB-holotype; isotypes will be distributed in the exsiccate "Lecanoroid Lichens").

Thallus verrucose to verruculose, bullate, yellowish white to whitish grey, epruinose, glossy. Soredia absent. Prothallus whitish grey. Apothecia sessile, 0.3-0.7 mm in diam., discs light to dark grey-brown or greyish red-brown, epruinose. Apothecial margins concolorous with thallus, entire, verrucose. Cortex hyaline, opaque, inspersed with numerous small crystals, 20-35 µm thick, uniform. Amphithecium with large and small crystals (Pol +), small crystals dissolving in KOH (*melacarpella*-type). Parathecium hyaline, with small crystals (Pol +), 10-15 µm thick. Epihymenium red-brown to grey-brown, with crystals (Pol +) (*pulicaris*-type), *ca.* 10-15 µm high, crystals and pigmentation dissolving in KOH. Hymenium hyaline. Hypothecium and subhymenium hyaline. Paraphyses slightly branched and not thickened apically. Asci clavate, 8-spored. Spores broadly ellipsoid to ellipsoid, 7.5-11.0 x 4.5-7.0 µm.

Chemistry: containing atranorin (major), chloroatranorin (major), constipatic acid (minor), dehydroconstipatic acid (minor), stenosporonic acid (major), thiophanic acid (major), and an unknown fatty acid (minor).

Etymology: The name is based on the type locality, the Arafura Sea between far north Australia and New Guinea and Indonesia.

This species belongs to the *L. subfusca* group and is characterized by a glossy upper surface, bullate areoles, the *pulicaris-type* epihymenium, the *melacarpella*-type amphithecium, the broadly ellipsoid ascospores, and by the chemistry. Morphologically it is similar to *L. arnhemica* Lumbsch and *L. pseudistera* Nyl., but differs in having smaller ascospores and a different chemistry (Lumbsch, 1994). Another similar species is *L. wilsonii* Müll. Arg. which, however, contains usnic acid as major constituent and lacks crystals in the epihymenium (Lumbsch, Feige and Elix, 1995).

Lecanora arafurensis occurs on southerly exposed sandstone rocks at an elevation between 100 and 200 m in open *Eucalyptus* woodlands. Associated lichens include *Biatora somediosa* Rambold, *Buellia* spp., *Caloplaca leptozona* (Nyl.) Zahlbr., *Chrysothrix candelaris* (L.) J.R. Laundon, *Dirinaria batavica* Awasthi, *Lecanora arnhemica* Lumbsch, and *Tephromela arafurensis* Rambold. It is known only from northern Australia.

Additional specimens examined: AUSTRALIA. NORTHERN TERRITORY. Stuart Hwy, 41 km NW of Pine Creek, 160 m, 13°36'S, 131°32'E, 18.7.1991, *J.A. Elix 28106, H.T. Lumbsch & H. Streimann* [topotype] (CANB); Robin Falls, 13 km SSE of Adelaide River Settlement, 140 m, 13°22'S, 131°08'E, *J.A. Elix 28205, H.T. Lumbsch & H. Streimann* (CANB). - WESTERN AUSTRALIA. Kimberleys, Gibb River Road, 45 km SSE of Wyndham, 140 m, 15°53'S, 128°14'E, 16.7.1991, *H.T. Lumbsch 8817g, J.A. Elix & H. Streimann* (hb. Lumbsch); Kununurra-Timber Creek Hwy, 25 km SE of Kununurra, 100 m, 15°54'S, 128°56'E, 9.7.1991, *H.T. Lumbsch 8765n, J.A. Elix & H. Streimann* (hb. Lumbsch).

2. **Lecanora austrointumescens** Lumbsch & Elix, sp. nov.

(Figs 4 & 5)

Planta corticola. Thallus verruculosus vel verrucosus, luteo-albidus usque ad luteogriseus. Soredia nulla. Prothallus non evolutus vel albidus. Apothecia sessilia, 0.5-1.0 mm in diametro, disci aurantiacofusci vel clare rubrofusci, epruinosi vel leviter pruinosi. Margines apotheciorum verrucosi vel flexuosi, sorediosi vel esorediosi. Cortex hyalinus, inspersus, 15-30 μm. Amphithecium crystalla magna minutaque continens. Parathecium hyalinum, ca 10-15 μm crassum. Epihymenium rubrofuscum, granulosum. Hypothecium et subhymenium hyalinum. Asci clavati, octospori. Sporae hyalinae, ellipsoideae, 9.5-12.0 x 5.0-7.0 μm. Thallus atranorinum et acidum usnicum continens.

Type: Australia. Western Australia, Porongorup Range, Porongorup National Park, track to Hayward Peak, 22 km ESE of Mount Barker, 320 m, 34°41'S, 117°52'E, 16.9.1994, *H.T. Lumbsch 10832a, J.A. Elix & H. Streimann* (CANB-holotype, hb. Lumbsch-isotype).

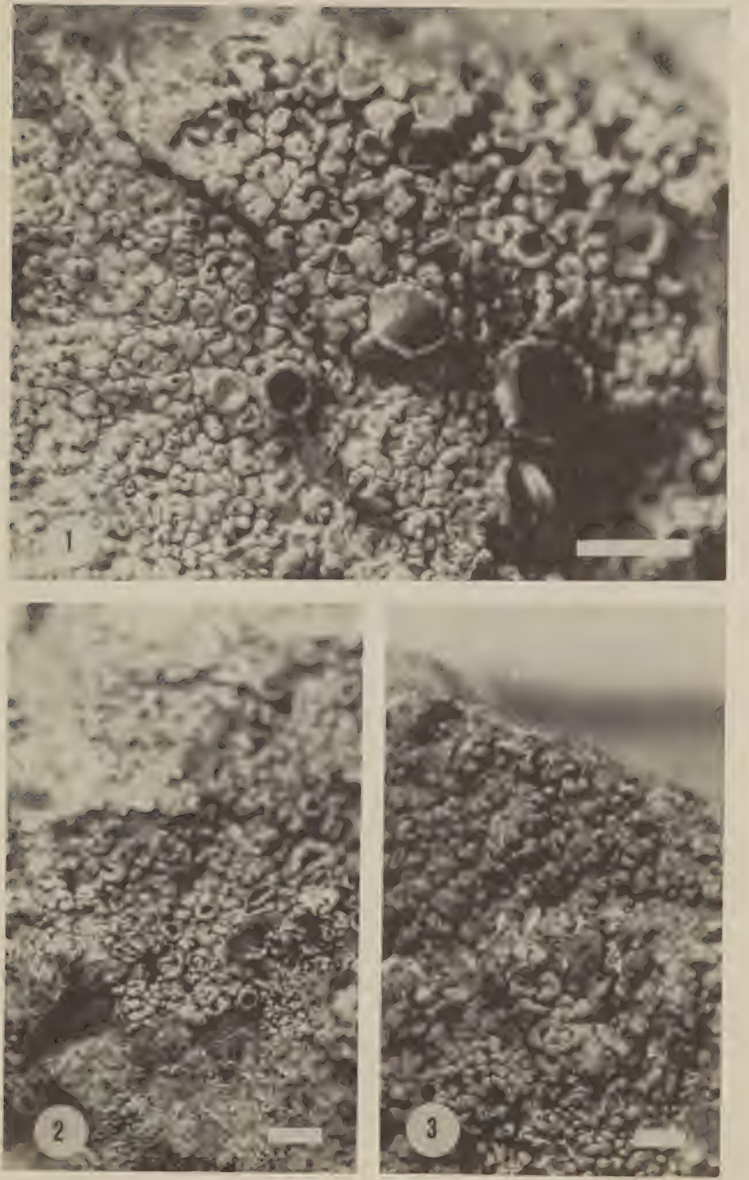
Thallus verruculose to verrucose, thin, yellowish white to yellowish grey, epruinose. Soredia absent. Prothallus not visible or whitish grey. Apothecia sessile, 0.5-1.0 mm in diam., discs light red-brown to orange-brown, epruinose to slightly grey pruinose. Apothecial margins concolorous with thallus, entire, more or less verrucose, flexuose, sorediate or not. Cortex hyaline, inspersed with numerous small crystals, 15-25 µm wide laterally and 20-30 µm basally, uniform, vanishing when sorediate. Amphithecium with large and small crystals (Pol +) (*melacarpella*-type). Parathecium hyaline, without crystals (Pol -), 10-15 µm thick. Epihymenium reddish brown, with small crystals (Pol +), dissolving in KOH (*chlarotera*-type), *ca.* 10-15 µm high. Hymenium hyaline, inspersed with small oil droplets. Hypothecium and subhymenium hyaline. Paraphyses slightly branched and thickened apically. Asci clavate, 8-spored. Spores ellipsoid, 9.5-12.0 x 5.0-7.0 µm.

Chemistry: containing usnic acid (major) and atranorin (minor).

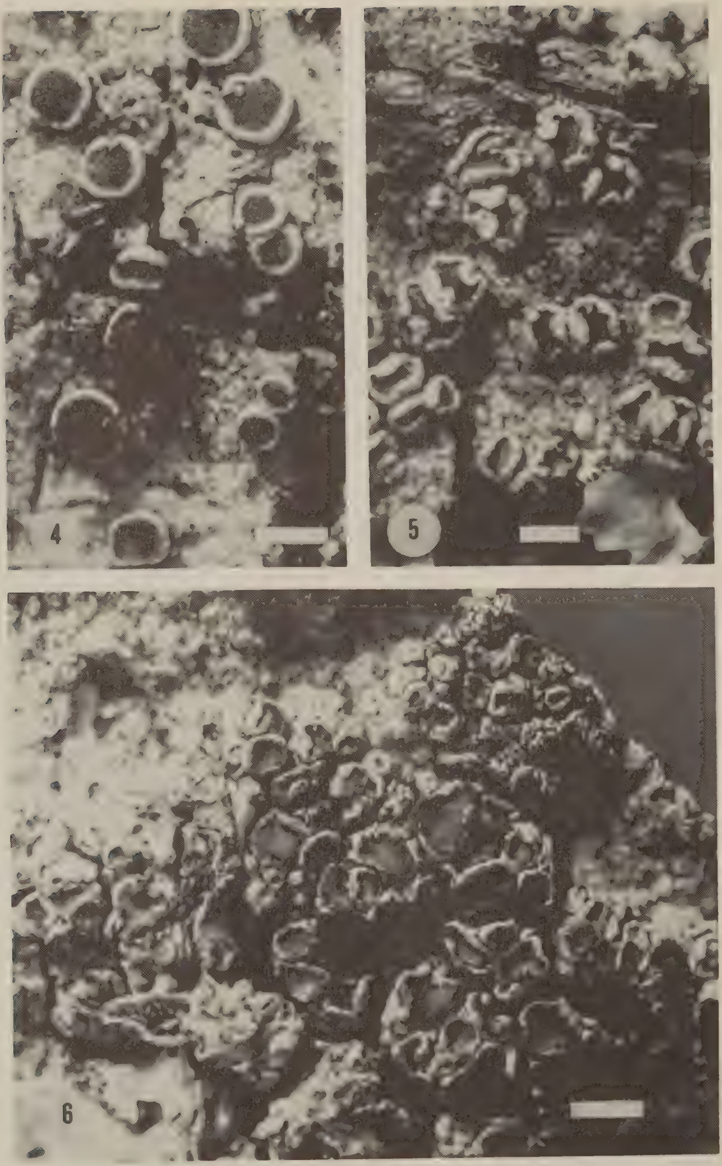
Etymology: The name combines *australis* (latin) = south, southern, and *intumescens* (a species of *Lecanora*); the name refers to the distribution (in Australia) and the general appearance (similar to *L. intumescens*) of the new species.

This species belongs to the usnic acid containing species of *Lecanora sensu stricto* and is characterized by the orange-brown to red-brown apothecial discs, the flexuose margins which often become sorediate, the apothecial anatomy, and the presence of usnic acid and atranorin. Morphologically it is reminiscent of a weakly pruinose morphotype of the Holarctic *L. intumescens* (Rebent.) Rabenh., but this species differs in numerous characters, including the chemistry (atranorin and psoromic acid) and apothecial anatomy (lacking a cortex, and containing small crystals in the amphithecium) (Lumbsch et al., 1997). Other similar species include *L. flavopallida* Stirton which, however, is readily distinguished by its different chemistry (chlorinated xanthones) and the lack of algae in the amphithecium (Guderley, Lumbsch and Elix, 1997). Among the usnic acid containing species of *Lecanora sensu stricto*, *L. austrointumescens* is distinguished by the more or less sorediate apothecial margins, the absence of any phenolic substances other than usnic acid and atranorin, and the epruinose to slightly pruinose apothecial discs (Lumbsch, Feige and Elix, 1995). *Lecanora floridula* Lumbsch and *L. transvaalensis* Lumbsch also lack phenolics other than usnic acid and atranorin, but can be distinguished by disc colour, and epihymenial or amphithecial crystal characters.

Lecanora austrointumescens occurs on bark including that of *Acacia* and *Agonis*. This new species in only known from south-western Australia where it occurs in dry sclerophyll forests.



Figs 1 - 3. Species of *Lecanora*. - *L. arafurensis*, holotype (CANB). Scale bars = 1 mm.



Figs 4 - 6. Species of *Lecanora*. - 4 & 5. *L. austrointumescens*. 4. holotype (CANB), 5. *Moberg A6:17 & Owe Larsson* (UPS). - 6. *L. contractuloides*, holotype (CANB). Scale bars = 1 mm.

Additional specimens examined: AUSTRALIA. Western Australia. Mt. Chudalup, 17 km SSE of Northcliffe, 185 m, 34°46'S, 116°05'E, 14.9.1994, *E. & H.T. Lumbsch 10805a, J.A. Elix & H. Streimann* (hb. Lumbsch), *J.A. Elix 41203, 41204, H.T. Lumbsch & H. Streimann* (CANB); Porongorup Range, Porongorup National Park, track to Hayward Peak, 22 km ESE of Mount Barker, 320 m, 34°41'S, 117°52'E, 16.9.1994, *J.A. Elix 41419, H.T. Lumbsch & H. Streimann* (CANB); Wonnerup, *ca.* 10 km ENE of Busselton, 30 m, 33°38'S, 115°26'E, 20.2.1992, *R. Moberg A6:17 & B. Owe-Larsson* (UPS).

3. **Lecanora contractuloides** Lumbsch & Elix, sp. nov.

(Fig. 6)

Planta saxicola. Thallus crustuloso-squamulosus vel peltatus, luteo-albidus usque ad albido-griseus. Soredia nulla. Prothallus non evolutus. Apothecia sessilia, 0.5-1.2 mm in diametro, disci rubrofusci, epruinosi. Margines apotheciorum verrucosi. Cortex hyalinus, gelatinosus, 25-35 µm. Amphithecium crystalla deficiens. Epihymenium rubrofuscum, granulosum. Hypothecium hyalinum, gelatinosum. Subhymenium hyalinum. Asci clavati, octospori. Sporae hyalinae, ellipsoideae, 9.5-12.0 x 4.5-6.0 µm. Thallus 2,7-dichlorolichexanthonum continens.

Type: Australia. New South Wales. Kosciusko National Park, New Chums Hill, above the old Kiandra cemetery, 35°52'S, 148°30'E, 1460 m, 10.4.1985, *J.A. Elix 19117 & H. Streimann* (CANB-holotype).

Thallus crustose-squamulose to peltate, yellowish white to whitish grey, epruinose, glossy, covered by an epinecral layer, but the lower surface of thallus with a *ca.* 25µm thick, gelatinuous cortex. Soredia absent. Prothallus not visible. Apothecia immersed when young, sessile to constricted at base when mature, 0.5-1.2 mm in diam., discs red-brown, epruinose. Apothecial margins concolorous with thallus, thick, more or less verrucose. Cortex hyaline, opaque, gelatinuous, 25-35 µm wide laterally and 30-35 µm basally, uniform. Amphithecium lacking crystals (Pol -), densely packed with algal cells. Amphithecial algal layer continuous below the hypothecium. Epihymenium red-brown, not altered by KOH, with numerous small crystals (Pol +), dissolving in KOH, *ca.* 10-15 µm high. Hymenium hyaline, inspersed with oil droplets. Subhymenium hyaline. Hypothecium hyaline, thick and gelatinous. Paraphyses slightly branched and capitate (up to *ca.* 3.5 µm) apically. Asci clavate, 8-spored. Spores ellipsoid, 9.5-12.0 x 4.5-6.0 µm.

Chemistry: containing 7-chlorolichexanthone (trace), 7-chloro-6-*O*-methylnorlichexanthone (minor), 2,7-dichlorolichexanthone (major), and 2,7-dichloro-6-*O*-methylnorlichexanthone (minor).

Etymology: The name is derived from *contractula* (a species of *Lecanora*) and *eidos* (greek) = having the form of; indicating that the new species is similar to *L. contractula*.

This species is well characterized among the Australian *Lecanora* spp. by its squamulose to peltate thalline morphology. This species belongs to subgenus *Placodium* and is the second species of that subgenus known from Australia. The other taxon is the cosmopolitan *L. muralis* (Schreb.) Rabenh. which, however, is very rare in Australia and only known from South Australia. Morphologically, this new species is similar to *L. contractula* Nyl. and *Arctopeltis thuleana* Poelt which occur in arctic regions of the Northern Hemisphere (Poelt, 1983). It can be distinguished from the latter species by the presence of an epinecral layer instead of a true cortex on the upper surface of the thallus. *L. contractula* is similar but can be distinguished by the alternative chemistry and slightly smaller ascospores. *L. contractula* contains 2,5-dichloro-6-*O*-methylnorlichexanthone as the major constituent (Elix & Crook, 1992).

Lecanora contractuloides occurs on exposed siliceous rocks in subalpine grassland. It is only known from the type locality.

4. **Lecanora mobergiana** Lumbsch & Elix, sp. nov.

(Fig. 7)

Planta saxicola. Thallus continuus vel disperso-verrucosus vel verruculosus, luteo-albidus usque ad luteo-griseus. Soredia farinosa, 15-25 µm in diametro. Soralia orbicularia, luteo-albdius. Prothallus albido-griseus. Apothecia sessilia, 0.4-0.8 mm in diametro, disci rubrofusci, epruinosi. Margines apotheciorum laeves, verrucosi, sorediosi. Cortex hyalinus, inspersus, 25-35 µm. Amphithecium crystalla magna minutaque continens. Parathecium hyalinum, ca 10-15 µm crassum. Epihymenium rubrofuscum, egranulosum. Hypothecium et subhymenium hyalinum. Sporae ignotae. Thallus atranorinum et acidum usnicum continens.

Type: Australia. Western Australia, Walpole-Nornalup National Park, The Knoll, 1-10 m, 34°59'S, 116°43'E, 23.2.1992, *R. Moberg A 19:10 & B. Owe-Larsson* (UPS-holotype).

Thallus continuous to dispersed verrucose to verruculose, yellowish white to yellowish grey, epruinose, sorediate. Soredia farinose, 15-25 µm in diam., in roundish soralia. Soralia pale yellow to yellowish white, convex to hemispherical, 0.6-1.5 mm in diam., coalescing and covering most parts of the thallus. Prothallus whitish grey. Apothecia sessile, 0.4-0.8 mm in diam., discs red-brown, epruinose. Apothecial margins concolorous with thallus, thin, entire, more or less verrucose, sorediate. Cortex hyaline, inspersed with numerous small crystals, 25-35 µm thick, uniform. Amphithecium with small and large crystals (Pol +)

(*melacarpella*-type). Parathecium hyaline, without crystals (Pol -), 10-15 µm thick. Epihymenium red-brown, not altered by KOH, without crystals (Pol -) (*glabrata*-type), *ca.* 10-15 µm high, with a 2.0 µm high hyaline layer above. Hymenium hyaline. Hypothecium and subhymenium hyaline. Paraphyses slightly branched and thickened apically. No mature ascospores seen.

Chemistry: containing atranorin (major), dissectic acid (trace), and usnic acid (minor).

Etymology: the name was chosen in honour of the distinguished lichenologist Dr. Roland Moberg (Uppsala). Björn Owe-Larsson and Moberg collected the type material of the new species.

Lecanora mobergiana is characterized by its sorediate thallus, sorediate, red-brown apothecial discs and presence of atranorin and usnic acid. Among the usnic acid containing species of *Lecanora sensu stricto* only the North American *L. brodoana* is also saxicolous. This species can be readily distinguished by the presence of zeorin, absence of small crytsals in the amphithecium, presence of crystals in the parathecium, and larger apothecia. Another similar species is *Lecanora* "A 24" which occurs at coastal regions in Australia. This taxon has not been found with apothecia and differs in lacking usnic acid and having bullate areoles (Lumbsch, 1994).

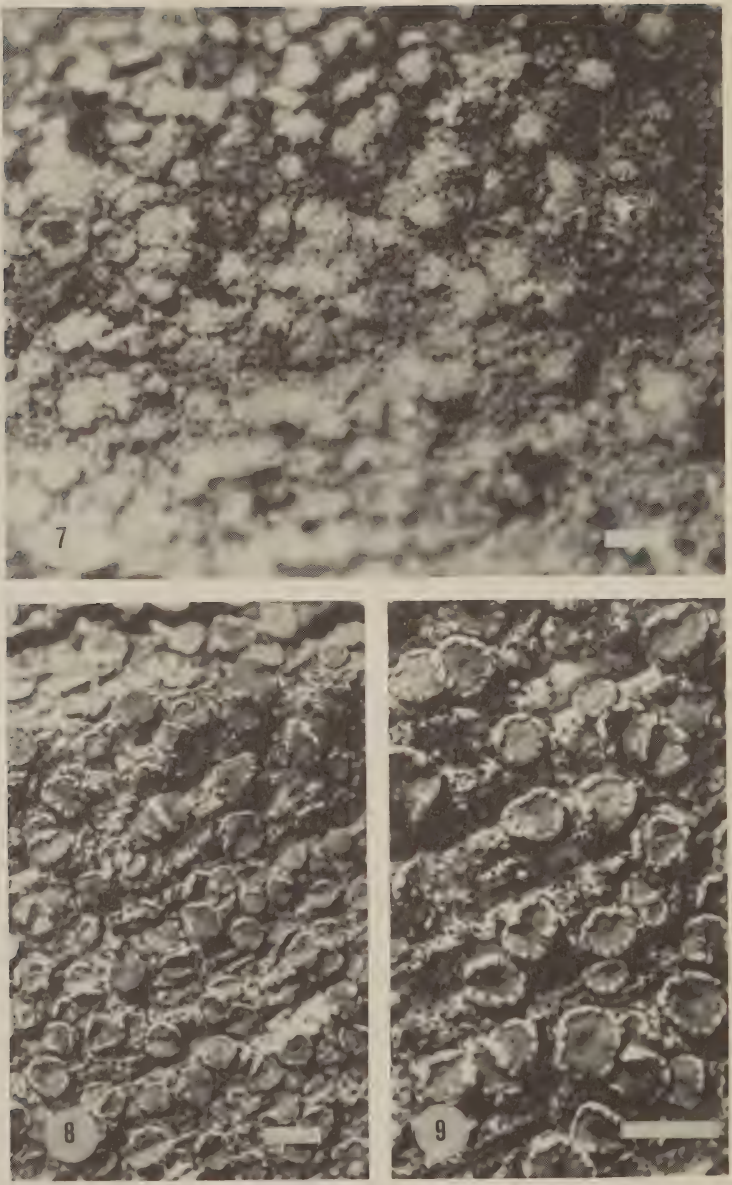
Lecanora mobergiana is only known from the type locality in Western Australia where it grows on siliceous rocks along the seashore. It was located in and above the *Caloplaca* zone in the xeric supralittoral.

5. **Lecanora placodiolica** Lumbsch & Elix, sp. nov.

(Figs 8 & 9)

Planta lignicola. Thallus disperso-verrucosus vel verruculosus, luteo-viridis usque ad luteo-griseus. Soredia nulla. Prothallus non evolutus. Apothecia sessilia, 0.4-1.0 mm in diametro, disci aurantiacofusci, pruinosi. Margines apotheciorum verrucosi vel flexuosi. Cortex hyalinus, gelatinosus, inspersus, 10-30 µm. Amphithecium crystalla minuta continens. Parathecium hyalinum, ca 10-15 µm crassum. Epihymenium aurantiacobrunneum, granulosum. Hypothecium et subhymenium hyalinum. Asci clavati, octospori. Sporae hyalinae, ellipsoideae, 12.0-15.5 x 5.5-7.0 µm. Thallus acidum usnicum, acidum placodiolicum, acidum pseudoplacodiolicum et acidum isousnicum continens.

Type: AUSTRALIA. AUSTRALIAN CAPITAL TERRITORY. Upper Molonglo Gorge Reserve, 18 km E of Canberra, 650 m, 35°16'S, 149°17'E, 5.7.1992, *J.A. Elix 33189* (CANB-holotype).



Figs 7 - 9. Species of *Lecanora*. - 7. *L. mobergiana*, holotype (UPS). - 8 & 9. *L. placodiolica*, holotype (CANB). Scale bars = 1 mm.

Thallus sparsely developed, dispersed verrucose to verruculose, yellowish green to yellowish grey, epruinose, glossy. Soredia absent. Prothallus not visible. Apothecia sessile, 0.4-1.0 mm in diam., discs orange-brown to light red-brown, slightly greyish pruinose. Apothecial margins concolorous with thallus, thick, verrucose to crenulate. Cortex hyaline, basally gelatinous, inspersed with numerous small crystals, reduced to *ca.* 10 µm wide laterally and 25-30 µm basally. Amphithecium with small crystals (Pol +), which dissolve in KOH, and densely packed with algal cells. Amphithecial algal layer continuous below the hypothecium. Parathecium hyaline, without crystals (Pol -), 10-15 µm thick. Epihymenium orange-brown, not altered by KOH, with crystals (Pol +), crystals dissolving in KOH, *ca.* 10-15 µm high. Hymenium hyaline. Subhymenium hyaline. Hypothecium hyaline, thick and gelatinous. Paraphyses slightly branched and unthickened apically. Asci clavate, 8-spored. Spores ellipsoid, 12.0-15.5 x 5.5-7.0 µm.

Chemistry: containing isousnic (minor), placodiolic (major), pseudoplacodiolic (minor), and usnic (major) acids.

Etymology: the name is derived from the major constituent in the new species, placodiolic acid.

Lecanora placodiolica is characterized by the relatively large ascospores, the pruinose apothecial discs, and the presence of usnic acid and placodiolic acid. It is a very distinctive species, not easily confused with any other *Lecanora* species in Australia. Superficially it resembles *L. varia*, but this species can be distinguished by the smaller ascospores and presence of psoromic and usnic acids (Purvis et al., 1992). Placodiolic acid is a common substance in placodioid taxa of *Lecanora* and in the genus *Rhizoplaca* (Leuckert, Poelt & Hähnel, 1977; Ryan & Nash, 1993, 1997), but is rather rare among the crustose species of *Lecanora*, with some exceptions in the *L. subfusca* group (Brodo, 1984; Elix & Lumbsch, 1996). These species, however, differ in containing atranorin and in their apothecial anatomy.

The new species is only known from the type locality in eastern Australia where it was collected on wood.

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TAXONOMY OF OXYPORUS LIGNOSUS COMB. NOV.

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SUMMARY

Detailed observations on morphological and cultural characters of *Polyporus lignosus* Kl. are given and in the light of these observations the taxonomy of the fungus is discussed. The new combination *Oxyporus lignosus* (Kl.) Roy & De is proposed.

INTRODUCTION

In India *Polyporus lignosus* Kl. grows on dead hardwoods where it causes a white rot. The present paper reports the results of detailed studies on the morphological and cultural characters of *P. lignosus*. The taxonomy of the species is also discussed in the light of these findings and a new combination of the species in the genus *Oxyporus* Donk is proposed.

MATERIALS AND METHODS

Observations were made on fresh specimens collected by the authors. Microscopic characters of the basidiocarps were studied form freehand sections mounted in 10% KOH and stained with 1% cotton blue. Cultures were established from context tissues of these basidiocarps and studied following the methods of Nobles (1948, 1965). Oxidase reactions were tested by the Bavendamn method as described by Davidson *et. al.* (1938). Voucher specimens and cultures are maintained in the Mycological Herbarium of the Visva-Bharati University (VBMH).

DESCRIPTION OF BASIDIOCARPS

Oxyporus lignosus (Kl.) Roy & De, comb. nov.
Basionym : *Polyporus lignosus* Kl., Linnaea 8 : 485, 1833.
= *Fomes lignosus* (Kl.) Bres., Ann. mycol. Brel. 10 : 496, 1912.
= *Rigidoporus lignosus* (Kl.) Imaz., Bull. Govt. For. Exp. Sta. Tokyo 57 : 118, 1952.

Basidiocarps annual, rarely perennial, attached by broad base, rarely resupinate to effused-reflexed, applanate to dimidiate, usually imbricate, leathery when fresh, hard and rigid on drying, 4-22 x 3-9 x 0.3-2.0 cm; upper surface reddish brown to yellowish brown, tomentose when young, becoming glabrous, concentrically zonate with a thin crust on drying; margin bright yellow when fresh, fading on drying, thin or rounded, usually strongly incurved on drying; context cream to wood coloured, corky, up to 1 cm thick; hymenial surface reddish brown, pores circular to angular, 6-9 per mm, pore tubes up to 6 mm long.

Hyphal system monomitic. Generative hyphae simple septate, sparsely branched, septa close or distant, hyaline to yellowish, thin- to slightly

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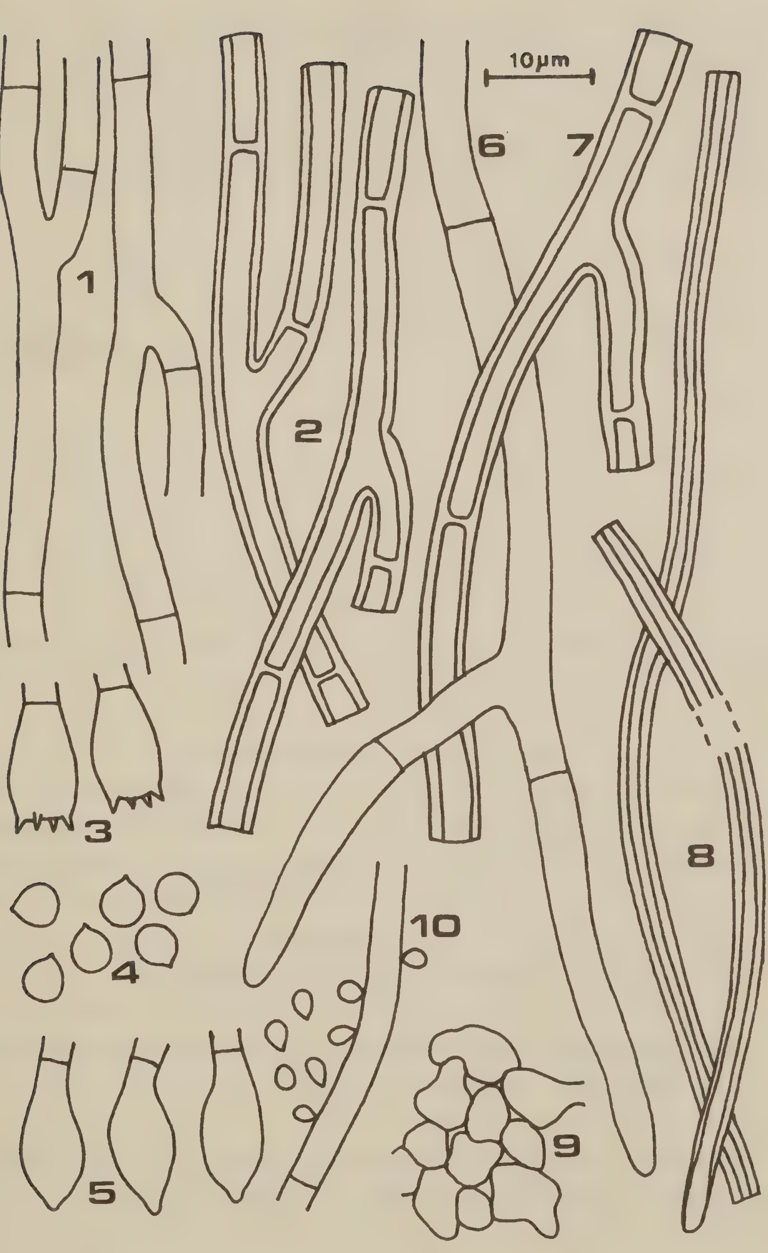
Figs. 1-10. *Oxyporus lignosus* (Kl.) Roy & De. 1-5. Microscopic structures from basidiocarp. 1. Thin-walled generative hyphae. 2. Slightly thick-walled generative hyphae. 3. Basidia. 4. Basidiospores. 5. Cystidia.
6-10. Microscopic structures from culture. 6. Hypha from advancing zone. 7. Slightly thick-walled, simple septate, branched aerial hypha. 8. Unbranched fibre hyphae. 9. Cuticular cells. 10. Conidia on conidiophore.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thick-walled, 2.4-4.6 µm wide (Figs. 1&2). Basidia hyaline, clavate, 4-sterigmate, 9-12 x 7-8 µm (Fig. 3). Basidiospores hyaline, thin-walled, smooth, globose, 3.5-4.5 x 3.5-4.0 µm (Fig. 4). Cystidia hyaline, thin-walled, mucronate, variable in shape, bulbous at the base, 10.8-14.2 x 3.8-6.2 µm, hymenial or subhymenial in origin (Fig. 5).

SPECIMENS EXAMINED : VBMH 8901, Darjeeling (W.B.), on dead branch of *Bauhinia purpurea* L., 20.10.89; VBMH 9202 and VBMH 9403, Dehra Dun (U.P.), on dead wood of *Ficus benghalensis* L., 17.9.94; VBMH 9504 and VBMH 9605, Darjeeling (W.B.), on log of *Shorea robusta* Gaertn. f., 12.10.96.

DISTRIBUTION IN INDIA : From published report it is evident that up to 1971 this fungus was known only from South India and South Andamans (Bakshi, 1971), but later we have collected it from two more localities, namely Dehra Dun (U.P.) and Darjeeling (W.B.).

GLOBAL DISTRIBUTION : Africa, Brazil, India, Mexico and Peru (Bakshi, 1971).

DESCRIPTION OF CULTURES

Growth characteristics : Growth rapid, plates covered in 2 weeks. Advancing zone even, hyaline, appressed or raised, aerial mycelium extended to the limit of growth. Mat white, gradually becoming brown to orange brown, silky, thin, subfelty to woolly-felty, faintly zonate, developing branched rhizomorphic strands which grow up the edges and onto the lids of petri dishes. Reverse slightly bleached.

Oxidase reactions : Positive on both gallic acid and tannic acid agar, colony about 2.2 cm in diameter on both.

Microscopic characters : Advancing zone — hyphae hyaline, thin-walled, simple septate, branched, 3.5-7.0 µm wide (Fig. 6).

Aerial mycelium — (a) hyphae as in the advancing zone except some slightly thick-walled (Fig. 7); (b) fibre hyphae hyaline, rarely septate, up to 3.2 µm wide, unbranched, present in the rhizomorphic strands (Fig. 8); (c) cuticular cells hyaline, thin-walled, forming a pseudoparenchymatous layer, formed in old cultures (Fig. 9); (d) conidia small, hyaline, thin-walled, smooth, subglobose, 1.5-3.5 x 1.2-3.0 µm (Fig. 10).

SPECIES CODE : 2.6.8.10.33.36.40.42.54 */*following the system of Nobles (1965)*]*.

CULTURES EXAMINED : VBMH 8901, 9202, 9403, 9504, and 9605.

DISCUSSION

From the foregoing description it is evident that the basidiocarps of *Polyporus lignosus* Kl. possess a monomitic hyphal system. The hyphal system, i.e. monomitic, dimitic or trimitic, of a species has been considered to be taxonomically important in circumscribing genera (Bondartzeva 1961, Teixeira 1962, Donk 1964, Fidalgo and Fidalgo 1967). These authors would not include two species with different hyphal systems in the same genus. Thus *Polyporus lignosus*, possessing a monomitic hyphal system, can not be placed either under the dimitic genus *Polyporus* Mich.: Fr. (Nunez and Ryvarden 1995) or under the trimitic genus *Fomes* (Fr.) Kickx (Teixeira 1994).

The genus *Rigidoporus* Murr. is considered as monomitic (Teixeira 1994) or mono- to apparently dimitic (Gilbertson and Ryvarden 1987) but David and Rajchenberg (1985) regarded it to be dimitic. Gilbertson and Ryvarden (1987) studied *Polyporus micromegas* Mont. (= *Polyporus microporus* Fr.), the type species of the genus *Rigidoporus*, and they found 'thick-walled hyphae, especially in the context where septa are difficult to observe and which are reminiscent of ordinary skeletal hyphae'. These hyphae resemble closely the skeletal hyphae of the genus *Phellinus* Quel., but they are hyaline in *Rigidoporus* and yellowish brown in *Phellinus*. So, *Rigidoporus* possessing a dimitic hyphal system with simple septate generative hyphae and skeletal hyphae (David and Rajchenberg, 1985), differs from *P. lignosus* which has monomitic hyphal system. Evidently, *P. lignosus* with monomitic hyphal system can not be placed in the dimitic genus *Rigidoporus*. Our critical observations on the morphological and cultural characters of *P. lignosus* reveal its close relationship with *Oxyporus populinus* (Fr.) Donk, the type species of the genus *Oxyporus* Donk. Both produce effused-reflexed to sessile, mostly imbricate, yellowish brown to reddish brown basidiocarps with hairy upper surface which become glabrous and hard on drying, pores circular to angular; both have a monomitic hyphal system with hyaline, simple septate, thin- to slightly thick-walled generative hyphae; clavate, hyaline, thin-walled, tetrasterigmatic basidia; hyaline, smooth-walled, globose basidiospore; hyaline, thin-walled cystidia; and both grow on hardwoods causing a white rot. The species code of *O. populinus* (Nobles 1965) is similar to that of *P. lignosus*. So many features in common suggest a close relationship between *P. lignosus* and *O. populinus*.

Therefore, it is concluded that *P. lignosus* and *O. populinus* are congeneric and the following new combination is proposed :
Oxyporus lignosus (Kl.) Roy & De, comb. nov.

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SEIMATOSPORIUM IGNOBILIS COMB. NOV.

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Abstract. A new combination, *Seimatosporium ignobilis* (Fautrey) Vanev, is proposed for the fungus *Discosia ignobilis* Fautrey found in France.

During the taxonomic revision of the genus *Discosia* Lib., an original specimen of *Discosia ignobilis* Fautrey was studied. The specimen was kindly provided by the Curator of the Herbarium of the Botanical Garden, Geneve, Switzerland.

Detailed studies of the specimen established that the fungus should be referred to the genus *Seimatosporium* (Nag Raj, 1993; Sutton, 1980). By its morphological features this fungus differs from all other named species.

SEIMATOSPORIUM IGNOBILIS (Fautrey) Vanev, comb. nov. (Fig. 1)

Basionym: *Discosia ignobilis* Fautrey, Rev. mycol. 12: 380. 1890.

Type: France, Cote D'Or, Noidan, sur les feuilles purrissantes du Platane D'Orient (*Platanus orientalis* L.), Mars 1890, F. Fautrey, ex C. Roumeguère, Fungi Selecti Galliae exs. N 5460 (G! – lectotype, selected here).

Conidiomata typically acervular, 60-130 µm in diam., subcuticular or intraepidermal, contricolous, separate or coalescent, circular or irregular in surface view, discoid or nearly flattened, dark brown or black. Conidiophores 12-35 X 1.5-3.5 µm, cylindrical, simple, thin-walled, straight or slightly curved, hyaline. Conidia 16.3-32 ($\bar{x}$ =23.4, $\sigma = 2.31$) X 3.3-6 ($\bar{x}$ = 4.21, $\sigma = 2.31$) µm, cylindrical, slightly tapering at both ends, with truncate base and an obtuse

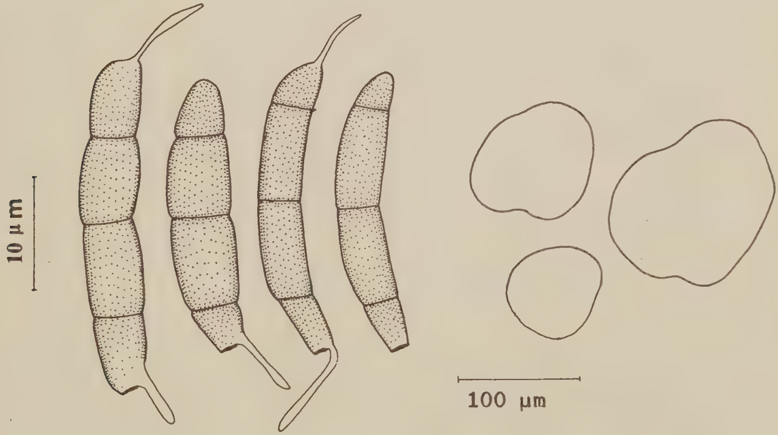

Fig. 1. Conidia and conidiomata of *Seimatosporium ignobilis*

apex, dorsiventral, sometimes nearly fusiform, straight or slightly curved, thick-walled, with 3 thick prominent septa, often constricted at the septa, two middle cells nearly equal in length, light brown, two end cells thin-walled, shorter than the middle cells, yellowish. Conidia with a single, unbranched, short, hair-like, hyaline, appendage at each end, straight or slightly curved. Apical appendage arising just at the top of the pointed apical cell basal appendage attached just above the truncate base on the ventral side of the conidium. Some conidia without basal or apical appendages.

ACKNOWLEDGEMENTS

This investigation was carried out at the Centraalbureau voor Schimmelcultures, Baarn, The Netherlands, and was supported by a grant from the International Agricultural Centre (IAC), Wageningen, The Netherlands.

I wish to thank the Curator of G for the loan of the original specimen examined.

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DISCOSIA SPEGAZZINII SP. NOV.

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Abstract. *Discosia spegazzinii* sp. nov.– a new species of the genus *Discosia* Lib. (Coelomycetes) found on dead leaves of *Carya* sp.(Juglandaceae) in Florida (U. S. A.) is described and illustrated.

Examination of a herbarium specimem received from LPS (Instituto de Botanica "C. Spegazzini," La Plata, Argentina) labeled "Discosia rugulosa" revealed an undescribed species of the genus *Discosia*. The fungus belonging to Section *Laurina* Vanev is described and illustrated.

DISCOSIA SPEGAZZINII VANEV, SP. NOV. (Fig. 1)

Pycnidia 125-180 μm diam., multilocularia, discoidea vel fere applanata, solitaria, vel interdum confluentes, epiphylla vel raro amphigena, sparsa, nitido-nigra; ostiolis 13-28 μm in diam., subrotundatis vel angularis, centralis vel excentricis, leviter elevatis, cellulis parvis intensius coloratis cincto. Cellulae conidiogenae 6.5-13 X 2.5-3μm, cylindricae vel ampulliformes, rectae vel leviter curvatae, hyalinae. Conidia 20-30 (x = 25.36) X 2.5-3 (x= 2.84) μm, holoblastica, elongato-ellipsoidea vel elongato-cylindracea, utrinque leviter angustata, apice rotundata, basi truncata, recta vel leviter curvata, dorsiventralia, pallido-brunnea, 3-septata, ad septa non constricta, duae cellulae mediae fere aequilongae; appendiculae filiformiae, rectae, vel leviter curvatae, hyalinae, proxime apicem basimque conidii formantur.

Typus: U. S. A., Florida, Gainesville, in foliis emortius *Caryae*, ex Herb. Univ. Nat. de La Plata, Mus. Nat. Speg.– Coll. mycol. (LPS!–holotypus, SOM–slide, isotypus).

Conidiomata pycnidial, 125-180 μm in diam., ostiolate, multilocular, discoid, epiphyllous (rarely amphigenous), separate, gregarious or scattered, more or less circular, subcuticular, black, with thick, stromatic, fertile base and thin, brittle, sterile upper wall. Ostioles 13-28 μm in diam., central or excentric, circular or irregular, slightly promiment, surrounded by darker thick-walled cells. Conidiogenous cells 6.5-13 X 2.5-3 μm, cylindrical or bottle-shaped, straight or slightly curved, hyaline. Conidia 20-30($\bar{x}$ = 25.36) X 2.5-3.5 ($\bar{x}$ = 2.84) μm, holoblastic, cylindrical or ellipsoidal, tapered at both ends with a truncate base and an obtuse apex, straight or slightly dorsiventrally curved, 3-euseptate, subhyaline, the two middle cells nearly equal in length, (much longer than the two end cells); conidial appendages hair-like, unbranched, lateral, hyaline, arising just at the apical and basal extremity of the ventral side of the conidium.

Discosia spegazzinii is the species with the longest conidia in Section *Laurina* . The species is only known from the U. S. A.

Key to the species of Section *Laurina* Vanev

1. Conidia less than 15 μm long..2
1*. Conidia more than 15 μm long..3
2. Conidia less than 2.5 μm wide; cylindrical, straight or slightly curved
....*Discosia quercicola*
2*. Conidia more than 2.5 μm wide; fusiform, arch-shaped or falcate
....*D. jordanovii*
3. Conidia less than 2.5 μm wide..4
3*. Conidia more than 2.5 μm wide..5

4. Conidia cylindrical, straight or slightly curved .... *D. aquatica*
4*. Conidia fusiform, arch-shaped or falcate .... *D. laurina*
5. Pycnidia 450-720 μm in diam.; conidia fusiform, mostly arch-shaped .... *D. petrakii*
5*. Pycnidia less than 200 μm in diam.; conidia cylindrical, mostly straight or slightly curved 6
6. Conidia 15-21 (x = 18.16) μm long .... *D. saccardoi*
6. Conidia 20-30 (x = 25.36) μm long .... *D. spegazzinii*

ACKNOWLEDGEMENTS

This research was carried out at the Centraalbureau voor Schimmelcultures, Baarn, The Netherlands, and was supported by a grant from International Agricultural Centre (IAC) in Wageningen, The Netherlands. I wish to thank the Curator of LPS for the loan of the authentic specimen examined.

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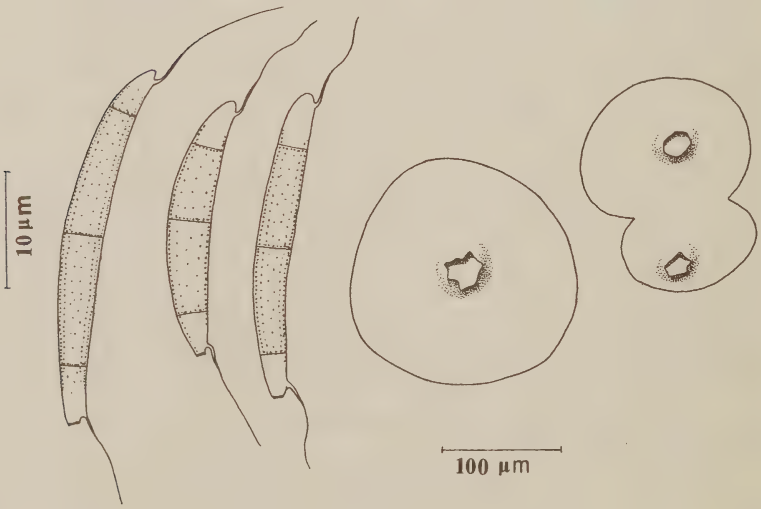

Fig. 1. Conidia and pycnidia of *Discosia spegazzinii*

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NEW OR RARE HYPHOMYCETES FROM CUBA. IX. SOME SPECIES FROM PINAR DEL RÍO PROVINCE

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ABSTRACT

Thysanophora verrucosa *sp. nov.*, a conidial fungus found on dead leaves of *Musa* sp. from Cuba, is described and illustrated. It is characterized by distinctly verrucose conidiophores and phialides. We list also seven other interesting hyphomycetes collected in Pinar del Río province, Cuba, mostly new records for the mycobiota of this country. A key to the ***Thysanophora*** species is provided. Furthermore, a new combination of ***Thysanophora*** and a new variety of ***Intercalarispora nigra*** are proposed.

Key words: ***Thysanophora***, ***Intercalarispora***, hyphomycetes, tropical fungi, Cuba.

RESUMEN

Se describe e ilustra ***Thysanophora verrucosa*** *sp. nov.*, un hongo conidial hallado sobre hojas muertas de *Musa* sp. en Cuba. Se caracteriza por poseer conidióforos y fiálides marcadamente verrugosos. También se relacionan otros siete hifomicetes interesantes recolectados en la provincia de Pinar del Río, Cuba, la mayoría de los cuales constituyen nuevos registros para la micobiota de este país. Se incluye una clave dicotómica para las especies de ***Thysanophora***. Además, se proponen una nueva combinación de ***Thysanophora*** y una nueva variedad de ***Intercalarispora nigra***.

Palabras clave: ***Thysanophora***, ***Intercalarispora***, hifomicetes, hongos tropicales, Cuba.

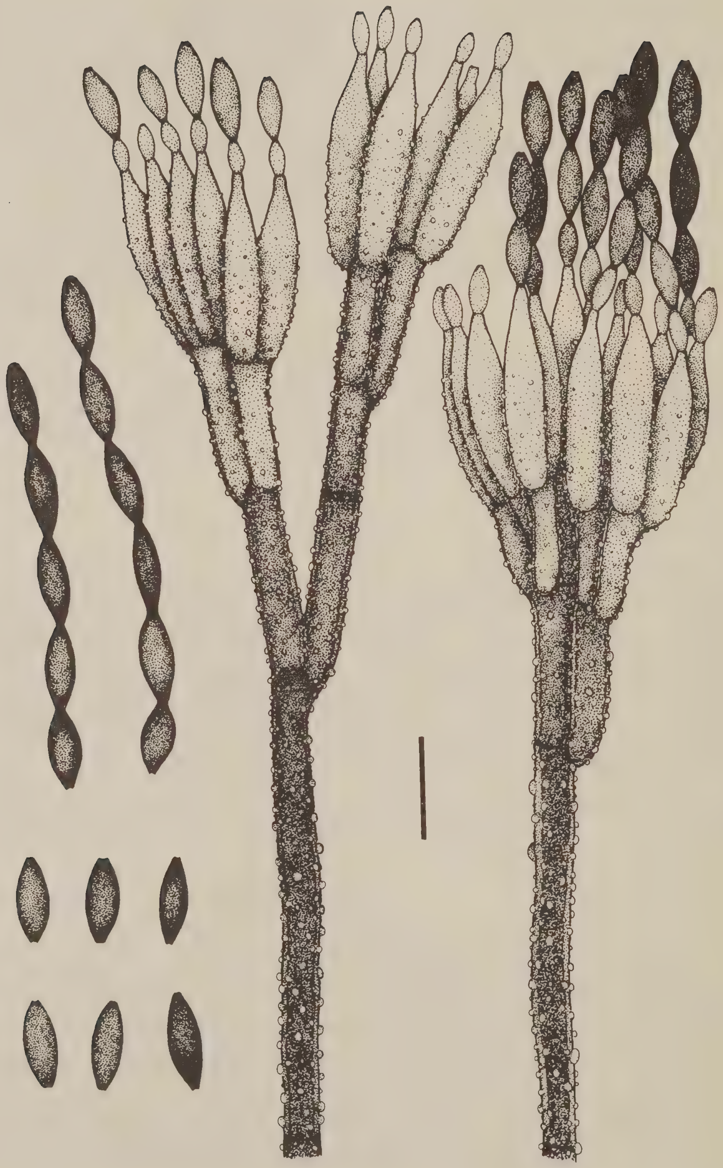


Fig. 1. ***Thysanophora verrucosa*** (HACM 9165), conidiophores and conidia. Scale bar = 10 μm.

INTRODUCTION

In the present work we describe some hyphomycetes collected during a brief fungus foray, on November 30 and December 1, 1994, in the dry period. We visited some of the most interesting natural localities in the west of Cuba, such as Viñales Valley in *Sierra de los Órganos* and Soroa in *Sierra del Rosario*. We determined over sixty species of hyphomycetes, but many of them were known previously from the island. Eight interesting taxa, including a new species of ***Thysanophora*** W.B. Kendr., are described. With the exception of ***Consetiella solida*** Hol.-Jech. & Mercado and ***Idriella rara*** R.F. Castañeda, all taxa are new records for Cuba. A new variety of ***Intercalarispora nigra*** J.L. Crane & Schokn. is proposed. The specimens examined, including types, are deposited in the Cuban Mycological Herbarium (HACM).

TAXONOMY

Thysanophora verrucosa Mercado, Gené & Guarro, *sp. nov.* Figs 1-4

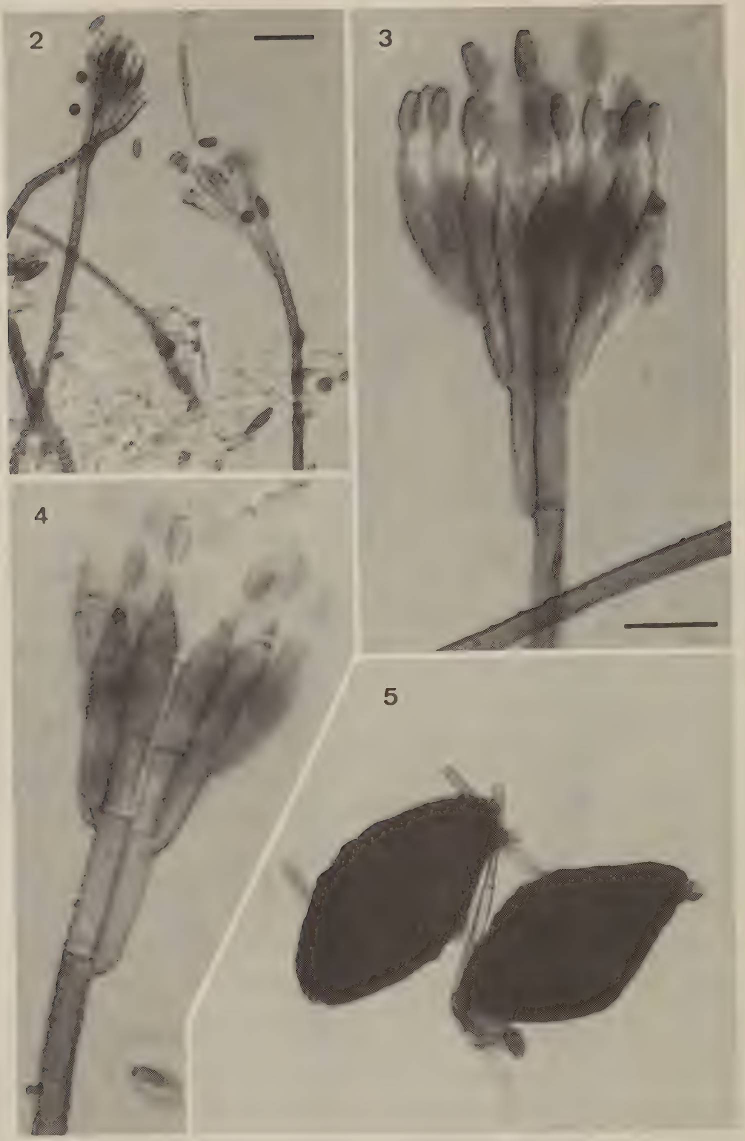
Etym.: referring to the verrucose wall of the conidiophores and phialides.

Hyphomycetes. Coloniae inconspicuae, brunneae. Mycelium in substrato immersum. Conidiophora macronematosa, mononematosa, erecta, recta vel plerumque flexuosa, apice capitulo penicilliformi, septata, verrucosa, grisea vel atrogrisea, 240-450 x 3-4.5 µm. Rami plerumque pallidiora, cum unaquaque penicillo 3-6 phialidibusque constituti. Cellulae conidiogenae monophialidicae, discretae, determinatae, lageniformes, verrucosae, pallide brunneae vel griseae, 17-22 x 3-4 µm. Conidia sicca, catenata, non septata, ellipsoidea, fusiformia vel ovoidea, basi et apice truncata, brunneogrisea vel pallide brunnea, laevia, 4.5-8 x 2.5-3.5 µm.

Holotypus: HACM 9165, *ex folii emortui Musae* sp., Mural de la Prehistoria, Viñales, provincia Pinar del Río, Cuba, leg. A. Mercado-Sierra, 1-XII-1994.

Hyphomycetes. Colonies inconspicuous, brown. Mycelium immersed in the substrate. Conidiophores macronematous, mononematous, erect, straight or mostly flexuous, penicillate, septate, distinctly verrucose, greyish brown, 240-450 x 3-4.5 µm; each branch sometimes paler and terminating in a penicillus of 3-6 phialides. Conidiogenous cells monophialidic, discrete, determinate, lageniform, verrucose, pale brown or greyish brown, 17-22 x 3-4 µm. Conidia dry, in short basipetal chains, 0-septate, ellipsoidal, fusiform or ovoidal, truncate at the ends, greyish brown to pale brown, smooth-walled, 4.5-8 x 2.5-3.5 µm.

Material examined: HACM 9165, on dead leaves of *Musa* sp., Mural de la Prehistoria, Viñales, Pinar del Río province, Cuba, coll. A. Mercado, 1 Dec. 1994.



Figs 2-4. ***Thysanophora verrucosa*** (HACM 9165), conidiophores and conidia; Fig. 5. ***Intercalarispora nigra*** var. ***minor*** (HACM 7019), conidia. Scale bars: Figs 2, 5 = 20 μm; Figs 3, 4 = 10 μm.

Thysanophora verrucosa differs from the remaining species of the genus (Kendrick 1961, Stolk & Hennebert 1968, Barron & Cooke 1970, Subramanian & Sudha 1985) by its conspicuously verrucose conidiophores and phialides. Morphologically, the conidia of the new taxon are similar to those of ***T. longispora*** W.B. Kendr. (Kendrick 1961, Matsushima 1975), but in the latter the conidia are longer (12-16.2 µm), subhyaline to olivaceous and minutely verrucose. ***Thysanophora verrucosa*** can also be compared with ***Phialomyces taiwanensis*** Matsush. (1985) because both have penicillate and pigmented conidiophores. However, conidia of the latter species are larger (7-10 x 3-5 µm) and, in addition, its conidiophores and phialides are smooth-walled. In our opinion, ***P. taiwanensis*** appears closer to ***Thysanophora*** than to ***Phialomyces*** Misra & Talbot. ***Phialomyces macrosporus*** Misra & Talbot (1964), the type species of the latter genus, is characterized by coarsely warted and very big conidia (20-28 x 16-20 µm) in comparison to the diameter of the conidiogenous cells (6-9 µm) and conidiophore stipe (4-8 µm). In addition, those conidia are provided with conspicuous hyaline connectives at each end. Furthermore, the conidiophores of this species are hyaline, or nearly so, bearing only a small number of phialides arranged verticillately at the tip of the conidiophore. All these features are absent in ***P. taiwanensis*** and therefore the following new combination is proposed:

> ***Thysanophora taiwanensis*** (Matsush.) Mercado, Guarro & Gené, *comb. nov.*
> Basionym: *Phialomyces taiwanensis* Matsush., Matsushima Mycological Memoirs 4: 12, 1985.

The recent species of ***Phyalomyces***, ***P. striatus*** R.F. Castañeda & W. Gams (1991), has been also described with connectives, although they are not shown in the figures. This species has hyaline conidiophores, and pigmented and catenate conidia ornamented with longitudinal ribs. Longitudinally striate conidia are also present in ***T. striatispora*** G.L. Barron & W.B. Cooke and ***Sagenomella striatispora*** (Onions & G.L. Barron) W. Gams (1978), however, the rest of morphological characteristics of these species are very different.

Key to *Thysanophora* species

1. Conidiophores and phialides distinctly verrucose. Conidia smooth, 4.5-8 x 2.5-3.5 µm .... ***T. verrucosa***
1. Conidiophores and phialides smooth 2

2. Conidiophores usually without proliferations........ 3
2. Conidiophores with sympodial proliferations........ 5

3. Conidia smooth, ellipsoidal 4
3. Conidia longitudinally striate, subglobose to ovoidal, 5.5-6.5 x 4-5 µm .... ***T. striatispora***

4. Conidia 4-5 x 2.2-3 µm .... ***T. asymmetrica*** Subraman.
4. Conidia 7-10 x 3-5 µm .... ***T. taiwanensis***

5. Conidial heads monoverticillate 6
5. Conidial heads biverticillate 7

6. Phialides 7.5-12 x 2.5-4 µm. Conidia 2-3.5 x 1.7-2.5 µm, smooth or finely roughened .... ***T. canadensis*** Stolk & Hennebert
6. Phialides 17-24 x 5-7 µm. Conidia 6.5-10 x 2-3.5 µm, rough .... ***T. taxi*** (R. Schneid.) Stolk & Hennebert

7. Phialides 15-18 x 4.5-5 µm. Conidia cylindrical or ellipsoidal, 12-16.2 x 2-4 µm .... ***T. longispora***
7. Phialides 7-14 x 2.5-3.5 µm. Conidia subspherical or limoniform, 2-5 x 1.5-3 µm .... ***T. penicillioides*** (Roum.) W.B. Kendr.

Intercalarispora nigra J.L. Crane & Schokn., Can. J. Bot. 61: 2243-2247, 1983.

Colonies effuse, black, shining. Hyphae mid brown, 2.5-5 µm wide. Conidiophores micronematous. Conidiogenous cells integrated, intercalary, sometimes terminal, determinate, cylindrical. Conidia blastic, solitary, dry, pleurogenous, oval or limoniform, black, dictyoseptate, septa only visible when the conidia are young, smooth-walled or slightly tuberculate by protrusion of pseudoparenchymatic cells, 75-105 x 43-50 µm, usually developing an apical extension.

Material examined: HACM 9166, on dead wood of an undetermined tree, Soroa, Pinar del Río province, Cuba, coll. A. Mercado-Sierra, 30 Nov. 1994.

The genus ***Intercalarispora*** was established by Schoknecht & Crane (1983). The type species, ***I. nigra***, was collected on decayed submerged wood in Illinois, USA. The genus is characterized by its blastic, black and dictyoseptate conidia, which arise solitarily from intercalary cells on undifferentiated hyphae. Our collection is quite similar to the original description, although conidia are longer (up to 105 µm) than those of the North American specimens [(50-)63-84(-90) µm long]. A similar specimen was also found in Cuba on a dead bamboo stalk, but it was described as ***Pithomyces niger*** Mercado & J. Mena (1986). It features smaller conidia (30.5-41 x 25-28 µm) than those of ***I. nigra***. Nevertheless, taking into account their morphological similarity, we now consider ***P. niger*** as a new variety of ***I. nigra***.

Intercalarispora nigra J.L. Crane & Schokn. var. ***minor*** (Mercado & J. Mena) Mercado, *var. nov.* Fig. 5

Synonym: *Pithomyces niger* Mercado & J. Mena, Acta Bot. Hung. 32: 201, 1986.

A var. ***nigra*** *differt conidiis minoribus (30.5-41 x 25-28 µm).*

Holotypus: HACM 7019, *in truncis mortuis Bambusae* sp.,Topes de Collantes, provincia Sancti Spiritus, Cuba, 2-II-1983.

Camposporium antennatum Harkn., Bull. Calif. Acad. Sci. 1: 37-38, 1884.
Fig. 6

Conidiophores up to 120 µm long, 5-6.5 µm wide. Conidia 42-60 x 7-8 µm, with 6-10 transverse septa and 1-3 divergent, hyaline, non-septate setulae which arise from the apical cell.

Material examined: HACM 9167, on unidentified dead leaves. Cueva del Indio, Viñales, Pinar del Río province, Cuba, coll. A. Mercado-Sierra, 1 Dec. 1994.

Common on decaying bark, palm petioles and dead leaves. Known from Australia, Japan, Peru, USA, Taiwan, and Tanzania (Ellis, 1971; Matsushima 1975, 1980, 1989, 1993).

Consetiella solida (Berk. & M.A. Curtis) Hol.-Jech. & Mercado, Mycotaxon 14: 310, 1982.
Fig. 7

Synnemata in fascicles, usually consisting of 2-4 laterally fused columns of cells, black, 300-1000 x 9.5-20 µm.

Material examined: HACM 9168, on dead petioles of *Roystonea regia* (Humb., Bonpl. & Kunth) O.F. Cook, Soroa, Pinar del Río province, Cuba, coll. A. Mercado-Sierra, 30 Nov. 1994.

It is a common synnematous fungus on petioles of *R. regia*. The synnemata are distinguished by their laterally appressed columns of cells without any distinct conidia. Known only from Cuba (Holubová-Jechová & Mercado-Sierra 1982, 1986).

Helicosporium virescens (Pers.) Sivan., The Bitunicate Ascomycetes and their Anamorphs, J. Cramer, Vaduz, p. 591, 1984.
Fig. 10

Conidiophores 150-250 x 4-6 µm. Conidia helicoidal in one plane, hyaline, 15-25 µm diam; conidial filament coiled 2-3 times, septate, 2-3 µm wide.

Material examined: HACM 9169, on dead petioles of *R. regia*, Soroa, Pinar del Río province, Cuba, coll. A. Mercado-Sierra, 30 Nov. 1994.

The teleomorph of this fungus is ***Tubeufia cerea*** (Berk. & M.A. Curtis) Höhn. This species is common on decaying wood and its distribution is worldwide (Goos 1989).

Idriella rara R.F. Castañeda, Deuteromycotina de Cuba. Hyphomycetes II. Inst. Invest. Fund. Agric. Trop. “Alejandro de Humboldt”, La Habana, p. 6, 1985. Fig. 8

Conidiophores branched, brown, paler towards the apex, up to 80 µm long, 6-7.5 µm wide. Conidiogenous cells 27-40 x 0.5-1 µm, forming cylindrical, hyaline crystals. Conidia falcate, mostly 1-septate, hyaline, 25-32 x 1-1.5 µm.

Material examined: HACM 9170, on unidentified dead leaves, Soroa, Pinar del Río province, Cuba, coll. A. Mercado-Sierra, 30 Nov. 1994.

This species was described by Castañeda-Ruíz (1985) from fallen leaves of *Calophyllum antillanum* Britton in Camagüey province, Cuba.

Oedocephalum glomerulosum (Bull. *ex* Chevall.) Sacc., Syll. Fung. 4: 47, 1886. Fig. 9

Conidiophores hyaline, 200-400 μm long, 15-20 μm wide at base, 10-12.5 μm at apex. Conidiogenous vesicle 27-35 μm wide. Conidia smooth or slightly roughened, obovoidal to ellipsoidal, 18-32 x 14-20 μm.

Material examined: HACM 9171, on undetermined dead leaves. Soroa, Pinar del Río Province, Cuba, coll. A. Mercado-Sierra, 30 Nov. 1994.

Some measurements on our specimen are intermediate between ***O. glomerulosum*** and ***O. macrosporum*** Penzig & Sacc. However, vesicles and conidia are typical of the former. Aberrations from the normal type were found several times (Stalpers 1974).

Ramichloridium schultzeri (Sacc.) de Hoog var. ***schultzeri***, Stud. Mycol. 15: 64, 1977.

Conidiophores 100-200 x 2-4 μm. Conidia subhyaline, slightly rough, ellipsoidal to obovoidal, 7-9 x 3-3.5 μm.

Material examined: HACM 9172, on dead stems of *Musa* sp., Cueva del Indio, Pinar del Río province, Cuba, coll. A. Mercado-Sierra, 1 Dec. 1994.

The above described specimen differs from var. ***tritici*** by the rather high incidence of aseptate conidia and by its smaller condiophores (de Hoog 1977).

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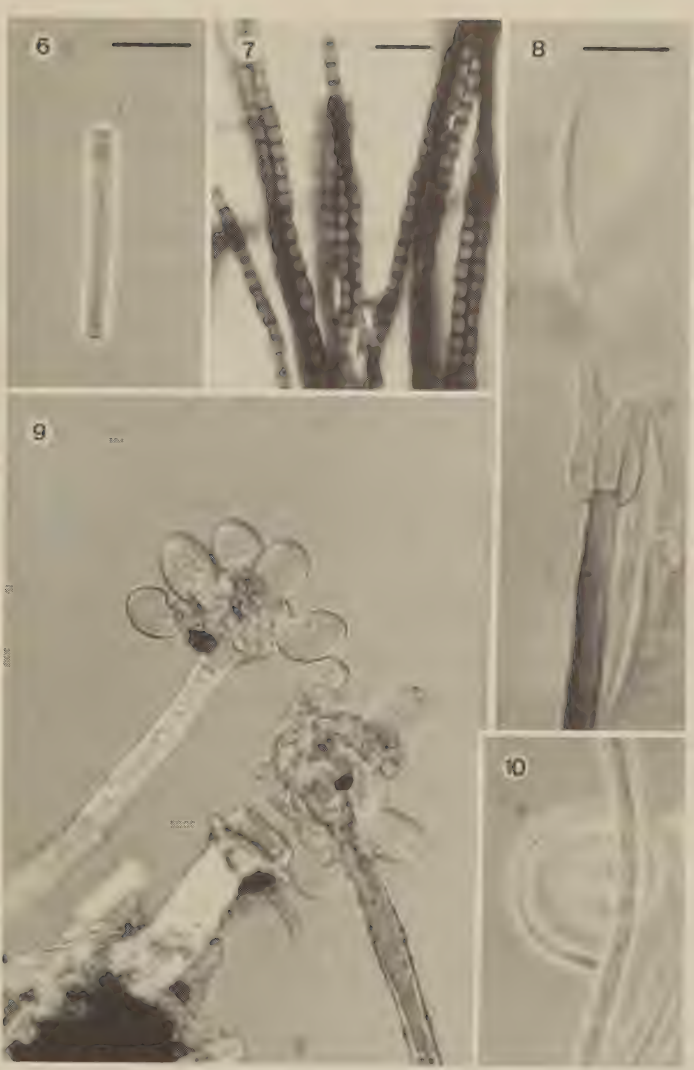

Fig. 6. **Camposporium antennatum** (HACM 9167), conidium; Fig. 7. **Consetiella solida** (HACM 9168), columns of laterally fused cells of synnemata; Fig. 8. **Idriella rara** (HACM 9170), conidiophore and conidia; Fig. 9. **Oedocephalum glomerulosum** (HACM 9171), conidiophores and conidia; Fig. 10. **Helicosporium virescens** (HACM 9169), part of a conidiophore with an attached conidium. Scale bars: Figs 6, 9 = 20 μm; Figs 7, 10 = 20 μm; Fig. 8 = 10 μm.

Castañeda-Ruíz R.F. and Gams W. 1991. A new species of ***Phialomyces***. *Mycotaxon* 42: 239-243.

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CONTRIBUTION TO THE STUDY OF FIMICOLOUS FUNGI. XXVII. A NEW CHAETOMIDIUM FROM ITALY WITH A CEPHALOTHECOID PERIDIUM

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ABSTRACT

A new species of ***Chaetomidium*** with a cephalothecoid peridium, obtained in culture on bovine dung in Italy, is described and illustrated. A dichotomous key to the ***Chaetomidium*** species with cephalothecoid peridia is provided.

Key words: Chaetomiaceae, ***Chaetomidium***, ***Thielavia***, cephalothecoid peridium; Ascomycota.

INTRODUCTION

At the recent meeting of the A.M.B. (Bresadola Mycological Association) scientific committee, held in Marola-Reggio Emilia (Italy), an interesting fungal specimen was obtained in a moist chamber on bovine dung collected in the late spring of 1997. After its microscopic examination, we realized that it was a typical representative of the **Chaetomiaceae** Winter (v. Arx *et al.*, 1988). The diagnostic characters are the globose, hairy, non-ostiolate ascomata, the ephemeral, pedunculate, very thin-walled asci clustered at the base of the ascoma, and the one-celled and pigmented ascospores devoid of gelatinous appendages. The presence of globose, non-ostiolate ascomata with a cephalothecoid peridium is typical of ***Chaetomidium*** (Zopf) Sacc. This genus was considered by von Arx (1975) as the "non-ostiolate counterpart" of ***Chaetomium*** Kunze, and differing from ***Thielavia*** Zopf in the hairy rather than smooth ascomata and in the pseudoparenchymatous rather than epidermoidal peridial texture (v. Arx *et al.*, 1988). Our species, especially because of the size of its ascospores, is clearly different from the others in ***Chaetomidium*** and consequently is described here as new.

DESCRIPTION AND DISCUSSION

Chaetomidium megasporum Doveri, Guarro, Cacialli et Caroti, *spec. nov.* (Figs. 1-3)
Etym: from the Greek = "with large spores"

Ascomata globosa, 250-300 µm crassa, fusco-brunnea, membranacea, omnino pilosa, ex fissuris discedentia. Peridium cephalothecoideum, hyphis cylindratis atque sinuosis instructum. Pili brunnei, sinuosi, usque ad 500 µm longi et ultra, brunneopallentes, crasse verrucosi. Asci octospori, clavati, longicaudati, 100-150 x 25-30 µm, evanescentes. Ascosporae 19-21.5 x 11-13 µm, ellipsoideae vel ovatae, fusco-ravidae, uniporosae, spisso- atque glabrotunicatae. Anamorphosis ignota.

Holotypus: MUCL 40586 ex fimo vaccino, Reggio Emilia, Italy, leg. F. Doveri, V-1997. Isotypi CLSM 02397, FMR 6230.

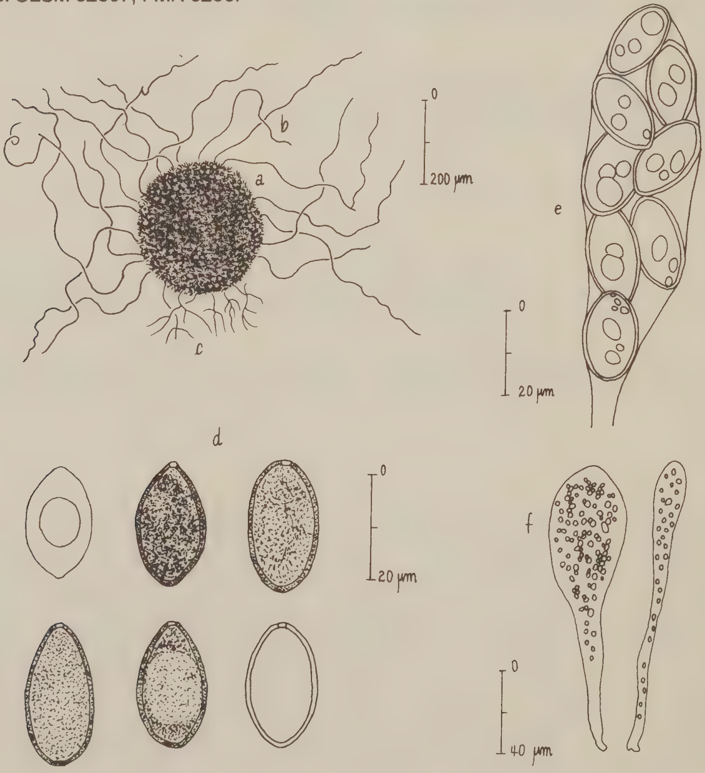


Fig. 1. a) ascoma. b) hairs. c) rhizoids. d) ascospores. e) ascospore arrangement inside the ascus. f) young asci.

Ascomata globose, 250-300 µm in diam, dark brown, membranous, covered with wavy hairs, dehiscent by splitting. Peridium cephalothecoid, two-layered: 1) inner layer with hyaline, 5-10 µm diam, thin-walled polyhedral cells; 2) outer layer of texture epidermoidea, made up of very wavy, thick-walled, dark-brown, 2-3 µm diam hyphae, which in surface view appear radiate inside penta- to hexagonal, 30-50 µm diam plates. From the base of the perithecium arise many dark-brown, 2-4 µm diam, septate, ramified, thick-walled rhizoids. Hairs arising from the outer intercellular spaces, longer than 500 µm, 2-4 µm diam, numerous, wavy, evenly septate, usually unbranched, slightly enlarged at the base, thin-walled (<1µm), light brown, paling distally, warted, rounded at the apex, sometimes

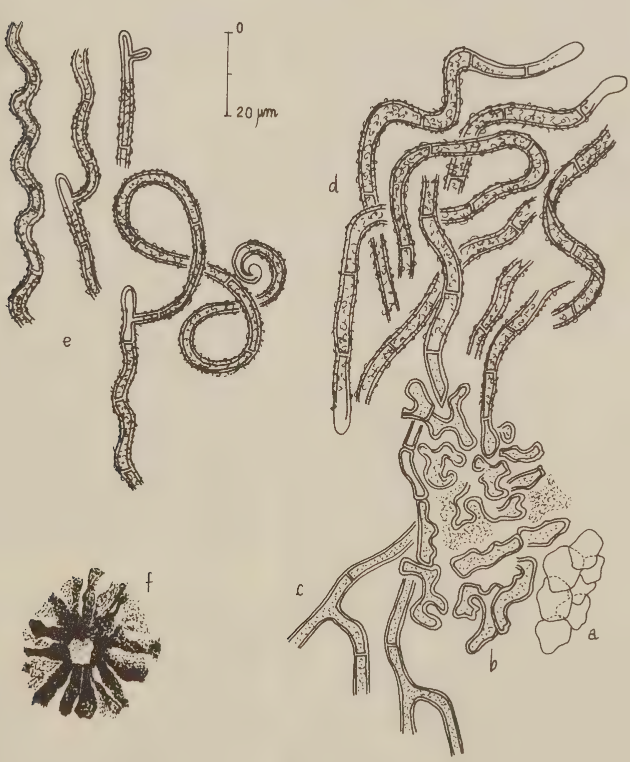


Fig. 2. a) inner layer of peridium. b) outer layer of peridium. c) rhizoids. d) hairs. e) apex of hairs. f) detail of peridium in surface view.

branched at right angles near the apex and the branches occasionally aborting and appearing to be a short diverticulum, or forming a very wavy or even loosely coiled additional end (fig. 2e). Asci 8-spored clavate, 100-150 x 25-30 μm, non-amyloid, unitunicate, long stipitate, evanescent. Paraphyses not observed. Ascospores biseriate, 19-21.5 x 11-13 μm, one-celled, hyaline when young, dark grey when mature, ellipsoidal to broadly fusiform, smooth, thick-walled, with an apical, slightly flattened germ pore ca. 1.5 μm diam. **Anamorph** not observed.

Material examined: MUCL 40586 on bovine dung (*Bos taurus*), Reggio Emilia, Marola 800 m, Italy, F. Doveri, May 1997. ***Chaetomidium khodense***: FMR 3688, cow dung, Wadi Hina, Dhofar Province, Sultanate of Oman, 20 Oct., 1989, A. E. ElShafie. ***Chaetomidium cephalothecoides***: strain ex type IMI 180791, on mouse dung, San Bernardino, California, USA, 2 Jan., 1970, G. L. Benny; FMR 2437, on sheep dung, Carrascoy Hill, Murcia, Spain, 12 March, 1988, M. Valldosera. ***Chaetomidium arxii***: strain ex type, ATCC 38819, on kangaroo-rat dung, San Bernardino, California, USA, 29 July, 1974, G.L. Benny.

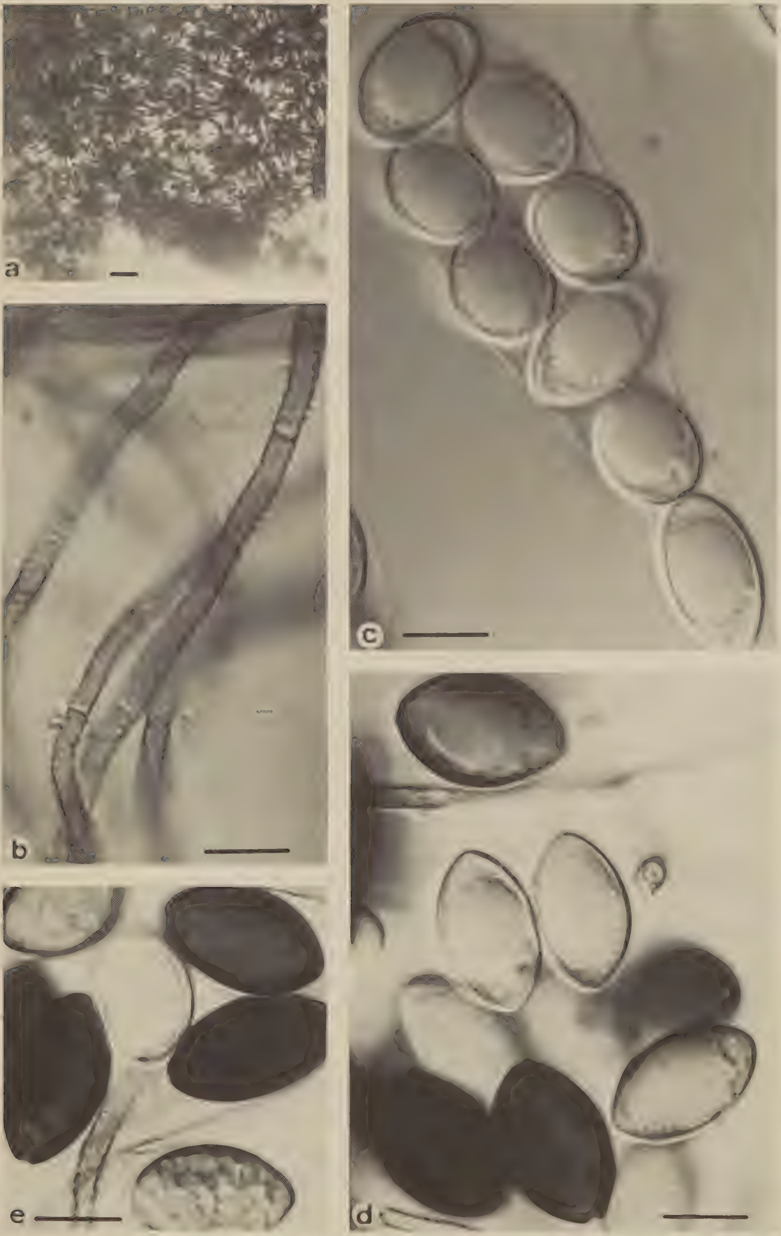
The main features of ***C. megasporum*** are its cephalothecoid ascomatal peridium, the large asci and ascospores, as well as some peculiarities of the hairs, which appear especially wavy and warted and sometimes with wavy or even coiled end branches at right angles. Such a combination of characters have never been observed in other ***Chaetomidium*** spp. and, in our opinion, they are sufficient for proposing a new species. Only three cephalothecoid ***Chaetomidium*** species have been recognized so far, each of them easily distinguishable from ***C. megasporum*** on the basis of the following features: In ***C. cephalothecoides*** (Malloch & Benny) Arx (Malloch & Benny, 1973; Valldosera & Guarro, 1992) and in ***C. khodense*** Cano, Guarro et Elshafie (1993) the ascospores and asci are noticeably smaller. In both these species the hairs (usually very long and flexuous) have a structure similar to that of our species, but differ in the smooth or at most slightly roughened walls and in the absence of branches or diverticula at right angles. Moreover in ***C. khodense*** the ascospores have a subapical germ pore and the outer peridial hyphae are irregularly placed inside the plates rather than arranged in a petaloid or radiate pattern. ***Chaetomidium arxii*** Benny (1980), a species described also by Lorenzo (1993), differs, as well as in the noticeably smaller spores, with the germ pore bounded by a dark ring, and the short, straight and usually smooth hairs.

KEY TO THE SPECIES OF *CHAETOMIDIUM* WITH A CEPHALOTHECOID PERIDIUM

1a.- Hairs straight and less than 400 μm long. Ascospores 13.9-15.2 x 10.7-11.4 μm, with a dark ring around the germ pore .... ***C. arxii***

1b.- Hairs flexuous and longer than 500 μm. Ascospores without a dark ring 2

Fig. 3. a) peridium in surface view. b) hairs. c) ascus. d,e) ascospores.


a
c
b
e
d

2a.- Hairs coarsely warted, sometimes with end branches at right angles. Ascospores 19-21.5 x 11-13 µm .... ***C. megasporum***

2b.- Hairs smooth or slightly roughened, usually unbranched. Ascospores smaller (11-15.5 µm long) 3

3a.- Outer peridial hyphae with a petaloid arrangement. Hairs often circinate at the apex. Ascospores 12-15.5 x 8-10.5 µm .... ***C. cephalothecoides***

3b.- Outer peridial hyphae irregularly arranged. Hairs non-circinate but sometimes coiled. Ascospores 11-13 x 6.5-7 µm .... ***C. khodense***

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FAERBERIA CARBONARIA IN MEXICO

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ABSTRACT

Faerberia has been known only from Europe. Recently, some collections were made in central Mexico, and there were no significant differences between these collections and others from Europe. Here, the species is described from Mexican specimens, and its overall distribution is discussed.

RESUMEN

Faerberia es un género que hasta ahora sólo se conocía de Europa. Recientemente, se hicieron algunas recolecciones del centro de México y no se encontraron diferencias significativas al compararlas con algunos materiales europeos. En el presente trabajo, se describe la única especie conocida del género a partir de materiales mexicanos y se discute su distribución.

INTRODUCTION

The genus name *Faerberia* was proposed by Pouzar (1981) to accommodate *Cantharellus carbonarius* (Alb. & Schw.: Pers.) Fr. *Faerberia* replaced the widely used generic name *Geopetalum*, which according with Pouzar (1981) is an illegitimate generic name (a synonym of *Hohenbuehelia*). Up to now, *Faerberia* has been considered strictly European in distribution (Corner, 1966; Hawksworth *et al.*, 1995; Moser, 1983; Singer, 1986).

The distinctive features of the genus are its cantharelloid hymenophore, leathery and dry pileus, presence of fusiform dextrinoid metuloids, dimitic hyphal system and absence of a gelatinized layer in the context (Corner, 1966; Singer, 1986).

In spite of extensive mycological exploration in some areas of North America, there is no record of *Faerberia carbonaria* from this geographical area. Nevertheless, during field work carried out by the authors in 1984-86 in the states of Mexico and Guerrero, in central Mexico, we collected some specimens which belong to this genus. Due to the possible biogeographical significance of this finding, we compared our specimens against material deposited in ENCB, FCME and IBUG Herbaria. We also compared European specimens deposited in TENN and in the mycological collection of University of Lille, France. Colors followed by alphanumeric notations are from Kornerup & Wanscher (1978). Abbreviations of statistical data include E (ratio of the spore length to spore width), E_m (mean E), L_m (mean spore length) and W_m (mean spore width).

DESCRIPTION OF THE SPECIES

Faerberia carbonaria (Alb. & Schw.: Fr.) Pouz. 1981. *Česká Mykologie* 35: 185-188.
≡ *Merulius carbonarius* Alb. & Schw. 1805. *Consp. Fung.*: 375.
≡ *Cantharellus carbonarius* (Alb. & Schw.: Fr.) Pers. 1874. *Hyménomyc. Eur.*: 456
≡ *Geopetalum carbonarium* (Alb. & Schw.: Fr.) Pat. 1887. *Hyménomyc. Eur.*, p. 127.
= *Merulius leucophaeus* Pers. 1825. *Mycol. eur. 2*: 15
= *Cantharellus anthracophilus* Lév. 1841. *Annls Sci. nat. Hist., sér. II, 20*: 236.
= *Cantharellus radicosus* Berk. & Br. 1866. *Ann. Mag. nat. Hist., ser III,18*: 54.
(Figs. 1-4)

Pileus 7-52 mm in diameter, umbilicate to infundibuliform, radially fibrillose, dry, fuscous (7-9F4) to tan (6E6); margin enrolled when young; smooth to crenulate or ragged in mature basidiocarp. Context leathery, cream (4A2), up to 2 mm wide; odor not distinctive. Hymenophore cantharelloid, decurrent, with rudimentary lamellum folds; lamellae not more than 1 mm deep, 1-2 times forked, grayish-orange (5B3), sub-distant. Stipe terete to flattened toward the apex, sometimes radicate, 13-66 mm X 2-5 mm, leathery, brown, sub-tomentose to smooth; tomentum whitish to pale brown. Basal mycelium white, with numerous white mycelial strands (Fig. 1).

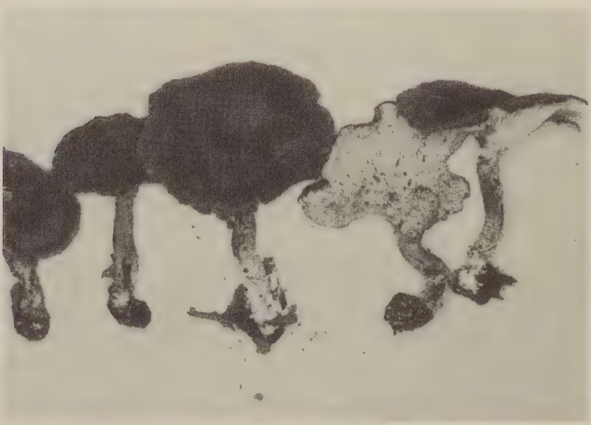


Fig. 1. Basidiomes of *Faerberia carbonaria*

Spores 7.5-9.8 (-10.6) X (3.5-) 3.9-5.1 µm [E=(1.62-) 1.67-2.30 (-2.40); E_m=1.97; L_m=8.76; W_m=4.46], sub-cylindric to cylindric, hyaline in KOH, smooth, thin-walled, inamyloid, 1-several guttate (Fig. 2); apiculus short. Basidia claviform, 34-62 µm X 6.4-11.2 µm, hyaline, 4-sterigmate, rarely 2-sterigmate, clamped; sterigmata up to 7.5 µm. Metuloids abundant, fusiform, 59-127 µm X 9.5-26.5 µm, thick-walled, 2.4-4.8 µm, dextrinoid, encrusted at the apex over 1/4 to 1/3 (Fig. 3); stipe metuloids scarce, up to 108 µm X 20 µm, arising from a cylindrical base longitudinally oriented (parallel to the stipe trama), up to 85 µm X 5.0 µm.

Cuticle 10-23 µm, of repent hyaline hyphae, 0.8-1.6 µm broad; surface hyphae yellowish to brown, (2.4-) 4.8-5.6 (-8.0) µm broad; some hyphae with encrusted pigments, clamped, (2.4-) 3.2-4.0 (-7.2) µm broad; pileocystidia scarce, capitate, ventricose-rostrate or fusiform-rostrate (Fig. 4), clamped, hyaline, up to 154 µm X 24 µm; caulocystidia similar to pileocystidia, thin-walled, up to 148 µm X 16 µm, sometimes encrusted at the apex, abundant on the stipe apex. Hyphal system dimitic. Pileus hyphae radially arranged; generative hyphae hyaline, clamped, (1.6-) 2.4-8.0 (-12.0) µm broad, uninflated; skeletal hyphae loosely interwoven with generative hyphae, unseptate, yellowish, 1.6-4.8 µm; wall of the skeletal hyphae 0.8-1.6 µm thick. Lamellar generative hyphae tightly interwoven, hyaline, clamped, 3.2-4.8 (-6.4) µm; skeletal hyphae interwoven with generative hyphae, sinuous, (1.6-) 2.4-4.0 µm, with yellowish walls, 0.8-1.6 µm thick. Stipe hyphae longitudinally arranged;, generative hyphae hyaline, clamped, (1.6-) 2.4-6.4 µm broad; skeletal hyphae slightly interwoven with generative hyphae, (2.4-) 3.2-4.8 µm broad, with yellowish walls, 0.8-1.6 µm thick; surface hyphae erect to sub-erect, loosely arranged. Mycelial strands dimitic; generative hyphae (1.6-) 2.4 (-9.6) µm; skeletal hyphae (1.6-) 2.4-3.2 µm.

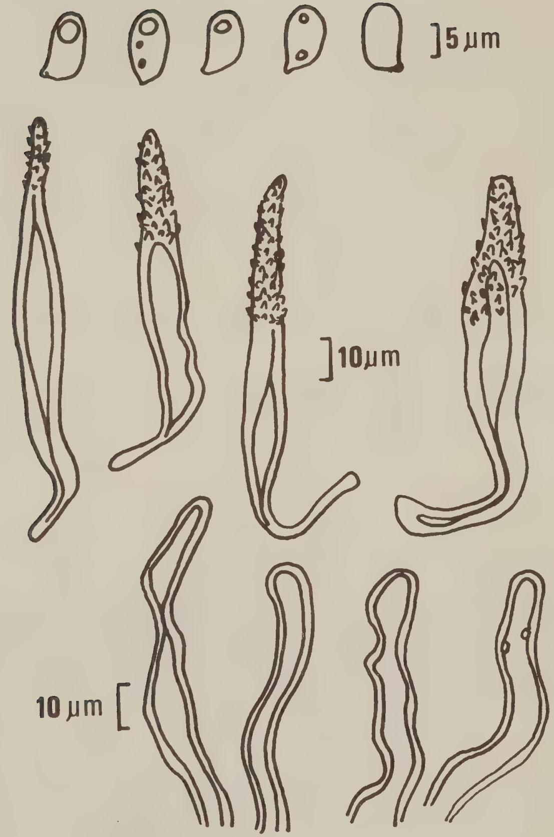
Habit, habitat and phenology in Mexico: Solitary or gregarious on charcoal or burnt soils, in *Quercus, Quercus-Pinus* or montane cloud forests, 1800-2800 m, July to October.

STUDIED SPECIMENS: DENMARK: Sep. 22, 1970, Leg. Moser s/n (**TENN** 37151). **FRANCE**: Sep., 1983, Expo Vellême; Sep. 2, 1985, leg. Bourgeois s/n. **GERMANY**: Auf einer Branstelle im Kieferwalde, Brandenburg, bei Prenden, Nieder-Barnim, Sep. 3, 1916, leg. P. Sydow 1418 (Dupl. in **TENN** 32751). **MÉXICO**: Guerrero: Cerro del Huizteco, Jul. 19, 1985, leg. Villegas 421 (**FCME**); Jalisco: Km 20 Tequila-Cerro del Tequila road, Aug. 29, 1985, 2800 m, leg. Guzmán-Dávalos 2542 (**IBUG**); Manantlan Sierra, leg. Guzmán-Dávalos 3382 (**IBUG**); Michoacan: Km 163 Toluca-Morelia road, Jul. 28, 1983, 2240 m, leg. Cifuentes s/n (**FCME**); State of Mexico: Municipality of Acambay, La Palma, Aug. 26, 1984, 2800 m, leg. Estrada-Torres 1143 (**ENCB**); Km 10 Valle de Bravo-Temascaltepec road, Jul. 23, 1982, 2000 m, leg. Guzmán 21557 (**ENCB**); Municipality of Tejupilco, Km 9 road to Nanchititla, Jul. 23, 1988, 1800 m, leg. Kong-Luz 649 (**ENCB**); 4 Km S from Villa del Carbon, Oct. 26, 1969, leg. Montes 55 (**ENCB**); Municipality of Valle de Bravo, Km 21 San Francisco Oxtotilpan-Valle de Bravo road, leg. Cifuentes 2953 (**FCME**). **SWEDEN**: Sep. 7, 1972, leg. Petersen s/n (**TENN** 36898).

DISCUSSION

Mexican specimens of *Faerberia carbonaria* fit well with the macroscopic descriptions given by Corner (1966), Moser (1983), Breitenbach & Kränzlin (1991), Bon & Marchand (1988), Noordeloos (1990) and Käärik (1992), but some slight differences were found in microscopic features. Corner (1966) reported larger spores, and Breitenbach & Kränzlin (1991) and Bon & Marchand (1988) described spores similar in length but wider than ours. Nevertheless, the size of the spores of Mexican collections conforms to those by Moser (1983), Noordeloos (1990) and Käärik (1992). In addition, there were no differences between spores of the Mexican specimens and those found in European voucher collections which we examined. This feature was constant in the exicatta from Mexico but it seems more variable in European collections, as judged by the literature.

Although similar in spore size, the values of E and E_m of the Mexican specimens were smaller than those given by Noordeloos (1990), and slightly bigger than those by Breitenbach & Kränzlin (1991). Curiously, the E_m of the Mexican collections (1.9-2.1) fall in the higher limit of Breitenbach & Kränzlin's (1991) rank (1.5-2.0) and in the lower of that of Noordeloos (1990) (1.9-2.5). In spite of these differences, we consider that Mexican collections are not significantly different from those of Europe, and that they belong to the



Figs. 2-4. 2.- Spores; 3.- Metuloids
4.- Pileocystidia

same morphospecies. If they are two geographic and biologically isolated populations, it is a thesis which needs to be proved through interbreeding tests, electrophoresis, etc.

As we have pointed out, *Faerberia* was known up to now only from Europe (Corner, 1966; Hawksworth *et al.*, 1995; Singer, 1986) where it is widely distributed always on charcoal and burnt soils. It is known from the Czech Republic (Pouzar, 1981), Denmark and Sweden (Käärik, 1992), France (Bon & Marchand, 1988), Great Britain (Pegler & Legon, 1995), the Netherlands (Noordeloos, 1990), Spain (Moreno *et al.*, 1986) and Switzerland (Breitenbach & Kränzlin, 1991). The presence of *Faerberia carbonaria* in Mexico, without records in other places from America, suggests a disjunct distribution difficult to understand. Another possibility is that this species had been introduced in Mexico. This idea is difficult to prove overall if we consider the low number of fungal records in Mexico before 1960, and that the oldest Mexican collection of the species is from 1969.

In Mexico, it is noteworthy that the species has only been collected in localities from the Neovolcanic Sierra (Fig. 5), but not from well-collected areas such as the Valley of Mexico or the Sierra Madre Oriental (states of Hidalgo and Veracruz). Moreover, it has not been found in the eastern portion of the Neovolcanic Sierra, in relatively well-explored areas such as the Popocatepetl-Ixtaccihuatl Volcanic zone. In conclusion, it is probable that its distribution in Mexico is confined to the higher places of the western portion of the Neovolcanic Sierra (states of Jalisco, Michoacan, Guerrero and Mexico, and probably Nayarit).

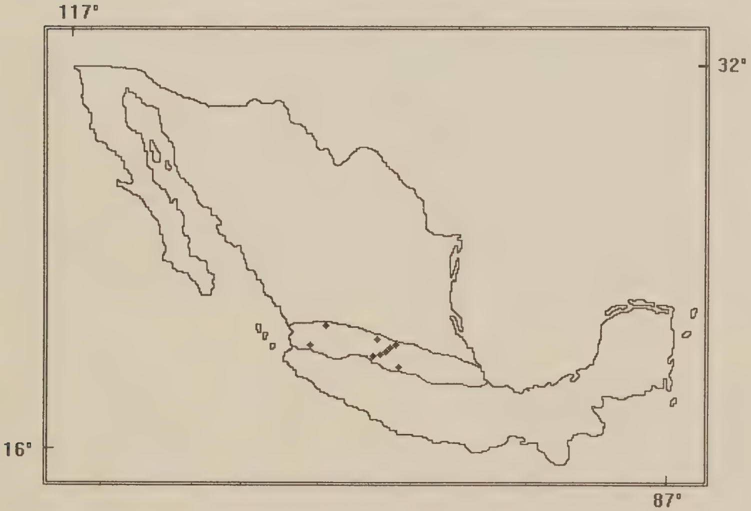


Fig. 5 Distribution of *Faerberia carbonaria* in Mexico
Delimited area represents Neovolcanic Sierra
◆ Collection sites

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GASTEROMYCETES OF THE CANARY ISLANDS. SOME NOTEWORTHY NEW RECORDS

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Canary Islands

Abstract

Seven species of Gasteromycetes are reported as new to the Canary Islands: *Myriostoma coliforme* (Dicks.:Pers.) Corda, *Tulostoma fimbriatum* Fr., *Tulostoma macrocephalum* Long, *Tulostoma melanocyclum* Bresad., *Mutinus caninus* (Huds.:Pers.) Fr., *Lysurus cruciatus* (Lepr. & Mont.) Lloyd, and *Lysurus mokusin* (Cibot:Pers.)Fr. Seven other taxa are given as chorological additions to some islands, though known previously from the other islands. Taxonomic, ecological and biogeographic considerations are given for each. *Lysurus gardneri* is removed from the fungus checklist of the Canary Islands as it was confused with *Lysurus cruciatus*. The reports for *Mutinus caninus* and *Lysurus mokusin* are the southernmost records for these species in the Northern Hemisphere.

Key words: Gasteromycetes, Canary Islands, taxonomy, ecology, biogeography.

Introduction

Gasteromycetes collected in the Canary Islands during the last few years have been critically studied. Some are new records to the islands of special biogeographic interest. The Gasteromycetes group is not very rich in the Canaries, hardly fifty-four species are known here, as opposed to, for example, Agaricales (about 280 species) or Aphyllophorales (about 260). On the other hand, it is a well-studied group and any new taxonomic or chorological findings are noteworthy.

Material and Methods

The material originates from several islands, Lanzarote [L], Fuerteventura [F], Tenerife [T], Gomera [G], La Palma [P], and La Graciosa [LG] and Alegranza [A] islets. The localities have an altitude ranging between 0-2050 m a. s. l., supporting a diverse typical vegetation characteristic of the inframediterranean bioclimatic belt with arid and semi-arid ombrotypes, the thermomediterranean with dry, subhumid and humid ombrotypes, depending on both altitude and exposure, and the supramediterranean with dry and subhumid ombrotypes.

Observations of spores and capillitium were performed in lactophenol-cotton blue, and an Olympus BH-2 microscope was used for microscopic measurements. All *exsiccata* are deposited in the TFC Herbarium, Mycological Section (here called TFC Mic.) of the University of La Laguna. The world distribution of each taxon is based on reliable bibliographical data, indicated in each case. For fungi, author name abbreviations are according to KIRK & ANSELL (1992), and for vascular plants to BRUMMITT & POWELL (1992).

Results

Lycoperdales:

Myriostoma coliforme (Dicks.: Pers.) Corda, *Anleitung Stud. Mycol.:* 204, 1842.
DESCRIPTION: Star-fungi. Fruit-body like *Geastrum* species. Exoperidium dirty greyish, up to 10 cm diam., membranaceous, splitting to about half-way into several pointed arms. Endoperidium whitish to shiny-grey up to 4.5 cm diam., thinwalled, dehiscing through 30-40 plane ostioles. Gleba brown. Capillitium threads pale brown, up to 3.5-4 µm diam., slightly branched, thickwalled with some small spines, tapering at the ends. Spores globose strongly ornamented with warts, papillae or even ridges, up to 6 µm diam. with the ornamentation (Fig. 1, 1).
HABITAT AND DISTRIBUTION: Only one specimen was found growing on soil, under *Eucalyptus globulus* Labill., in La Laguna (Tenerife), 560 m; 2.X.1994 (TFC Mic. 6840), *Leg. F.M. Díaz & I.T. Brito*. It is a new record for the Canary Islands. *M. coliforme* is a terricolous species, somewhat nitrophilous, growing in rich garden soil, under leafy trees, at edges of paths, etc. Cosmopolitan: Europe, Asia, America, South Africa (PILAT, 1958); cosmopolitan, Kenya (DRING & RAYNER, 1966). Several authors have reported it in Spain (Almería, Granada, Barcelona, Gerona, Madrid and Toledo) compiled by CALONGE (1990, 1996), and it is also recorded by CALONGE & ALMEIDA (1992) from Portugal.
TAXONOMIC REMARKS: The only specimen collected seems sessile, because columnar structures or pedicels were not evident at the base of the endoperidium. It is relatively common in young and immature specimens that the endoperidium does not develop these structures.

Nidulariales:

Cyathus olla Batsch: Pers., *Syn. Meth. Fung.:* 237, 1801.
HABITAT AND DISTRIBUTION: Six specimens growing on humid ground, very close to a "gavia" (traditional rainwater accumulation on clay sediments, which the farmers of Fuerteventura use for cultivation) in Fimapaire, an arid locality of the thermomediterranean bioclimatic belt (La Oliva, Fuerteventura), 200 m; 2.I.1990 (TFC Mic. 7152), *Leg. J.M. Torres Cabrera*. Two samples on humid and shady ground, in El Cedro, laurel forest communities of the thermomediterranean humid-subhumid bioclimatic belt (Garajonay National Park, Gomera), 1075 m; 22.X.1987 (TFC Mic. 1390), *Leg. U. & A. Reifenberger*. This species is known to the Canary Islands (WILDPRET *et al.*, 1972 [T]; BELTRÁN TEJERA *et al.*, 1989 [H]). In this paper we record it as new to Fuerteventura and Gomera. Its ecology in the Canary Islands is similar in all localities on plant debris, decaying grass etc., on eutrophic soil. Almost cosmopolitan species, widespread in N, E and S Africa, Siberia, Israel, Iran, China, Australia, New Zealand, N and S America, Europe (DENNIS, 1986). It is very common in Spain and Portugal (CALONGE, 1990, 1996; CALONGE & ALMEIDA, 1992).

Sphaerobolus stellatus Tode: Pers., *Syn. Meth. Fung.*: 115, 1801.
HABITAT AND DISTRIBUTION: On dead wood of *Eucalyptus globulus* Labill., Monte de Tobares, in *Erica-Myrica* community of the Canarian monteverde, with *Eucalyptus globulus* and several isolated specimens of *Castanea sativa* Mill. (Garajonay National Park, Gomera), 900 m a.s.l.; 8.XII.1989 (TFC Mic. 5327) *Leg. E.Beltrán Tejera & J.L. Rodríguez-Armas*. It is a new record to Gomera. This species was already recorded from Tenerife (WILDPRET *et al.*, 1972).

This cosmopolitan species grows on wood, plant debris or occasionally soil or dung (DRING, 1964). Common in Spain (CALONGE, 1996), and Portugal (CALONGE & ALMEIDA, 1992).

Phallales:

According to HAWKSWORTH *et al.* (1983) 6 families, 26 genera and 43 species are included in the order Phallales, of which two of them (Clathraceae and Phallaceae) are represented in the Canary Islands. Genera of the Clathraceae known in the islands are: *Clathrus* (*C. ruber* Micheli:Pers.; COOL, 1924 [T]; *Colus* (*C. hirudinosus* Cavalier & Sechier; BAÑARES & BELTRÁN, 1982 [T] and BAÑARES *et al.*, 1991 [G]) and *Lysurus*, which is commented on later. Phallaceae is represented in the Canaries by *Mutinus* and *Phallus*, which are also dealt with in this paper.

KEY TO FAMILIES CLATHRACEAE AND PHALLACEAE AND THEIR GENERA PRESENT IN THE CANARY ISLANDS

1. Mucilaginous gleba on the inner surface of a hollow head, which may be lattice-shaped or composed of several connivent or free arms in which case the gleba may be carried on the lateral surface of the arms .... 2. **Clathraceae**
1. Mucilaginous gleba externally on an unbranched head carried on a stipe emergent from a volva .... 4. **Phallaceae**
2. Receptacle a hollow latticed spherical or obovoid structure .... ***Clathrus***
2. Receptacle consists of several free, connivent or fused columns 3
3. Gleba carried on lateral or inner surface of several free or connivent columns .... ***Lysurus***
3. Gleba confined to a latticed fertile apical portion joined to the short stipe by several tubular columns .... ***Colus***
4. Gleba borne directly on the smooth apical part of the stipe .... ***Mutinus***
4. Gleba borne on a campanulate and externally rugulose pileus attached to the extreme tip of the stipe .... ***Phallus***

Lysurus mokusin (Cibot: Pers.) Fr., *Syst. Mycol.* 2: 286, 1823.
DESCRIPTION: Egg subglobose to elongated, up to 4 x 2.5 cm, whitish. Receptacle or stipe (to 12 cm length x 2 cm wide) white to reddish, with six conspicuous angles along its length and continuous above with the orange to reddish columns; tapering at the tip. Six connivent arms or columns or even united at their apices into a sterile spire. The brown-greenish gleba, is carried on the lateral surface of the arms. Spores cylindrical, thinwalled, smooth, 4.5-5 x 2-2.7 µm (Fig. 1, 2).
HABITAT AND DISTRIBUTION: Nitro-heliophilous fungi, on the lawn of Neptuno Hotel (Bajamar, Tenerife), 20 m a.s.l.; 9.XI.1994 (TFC Mic. 6851), *Leg. B. Rodríguez Ramos & S.Hernández Ramos. L. mokusin* is previously known from China (type locality),

Japan, and probably introduced into North America and Australia (DRING, 1980). It is a new record to the Canaries, and probably also introduced with the grass (*Stenotaphrum secundatum* (Watl.) O.Kuntze) brought from America. The only record for Spain (Gerona) that we know, was given in 1991 by MARTIN & VIDAL (*in* CALONGE, 1996). The latter author (*in* press), records it also for France, Germany, Italy, Sweden and Russia.

TAXONOMIC REMARKS: The basis of the distinction between *L. mokusin* and other species of *Lysurus* is its angular receptacle.

This is the second species of *Lysurus* recorded for the Canary Islands. *Lysurus gardneri* Berk. has been mentioned for Tenerife by WILDPRET & SANTOS (1972), based on the description and drawings of PILAT (1958), who confused it with ***Lysurus cruciatus*** (Lepr. & Mont.) Lloyd. Other authors (KREISEL, 1969; GARCÍA ROLLAN, 1980; CALONGE, 1983; *in* CALONGE, 1985) have also confused these very close species. The two most significant differences between them are: *L. gardneri* has from 4-6 relatively short columns with white sterile bases, while the orange-reddish columns of *L. cruciatus* have no sterile base. Therefore we must remove *L. gardneri* from the fungal checklist of the Canary Islands and add it as new *L. cruciatus.*

According to DRING (1980), *Lysurus cruciatus* is originally from South America. CALONGE (1985) comments that this species is probably introduced into North America, Europe, South Africa and Australia, and the European records of *L.gardneri* in fact correspond, in his opinion, to *L. cruciatus.*

Recently CALONGE & MARCOS (1992) have described *Lysurus cruciatus* var. *nanus* (*Holotypus*: Salamanca, Spain), which differs from the typical variety by the smaller sized stipe, not exceeding 50 mm. The measurements of the Canarian specimen agree with *Lysurus cruciatus* var. *cruciatus*.

Mutinus caninus (Huds.: Pers.) Fr., *Summa Veg. Scand.* 2: 433, 1849.

DESCRIPTION: Fruit-body very similar but smaller than *Phallus* species. Egg obovoid to elongated, rooting by several cord-like mycelial strands, up to 3 x 2 cm, whitish. Stipe cylindrical, up to 9 cm long x 1 cm wide, whitish to light yellow-orange but reddish at the apical portion, under the gleba. Gleba greenish-brown, with foul-smell, carried at end of stipe. Spores elliptical, thinwalled, smooth, 4-5 x 2 µm. (Fig. 2, 2).

HABITAT AND DISTRIBUTION: Several specimens were found on the ground in a humid shady place in the *Erica-Myrica* community in San Isidro Canarian monteverde (Breña Alta, La Palma), 780 m a.s.l., E; 18.I.1994 (TFC Mic. 6631), *Leg. J.M.Castro.* It is a terrestrial or ligni-saprophytic species, distributed in temperate regions of the Northern Hemisphere (mainly North America and Europe). Portugal (CALONGE, 1996). In Spain it seems be limited mainly to the northern part of the country (CALONGE, 1985). It is a new record for the Canaries, biogeographically very interesting as the southernmost record in the Northern Hemisphere, according to bibliographic references

TAXONOMIC REMARKS: Several authors have seen some taxonomic controversy between *M. caninus* and *M. ravenelii* (Berk. & Curtis) E.Fischer, because of their similarity. We agree with CALONGE (1985), who makes a very extensive discusion on it and concludes agreeing with other authors (e.g. BURT, 1896, 1928) that *M. ravenelii* is a synonym of *M. caninus*; finally he says: *"... it is possible that M. ravenelii could be a northern ecotype form of M. caninus, with fruitbody uniform reddish coloured, but I never have seen it".*

Phallus impudicus L.: Pers., *Syn. Meth. Fung.*: 242, 1801.
HABITAT AND DISTRIBUTION: Four specimens growing on the ground in a shady place within the thermomediterranean bioclimatic belt, in the typical *Aeonio-Euphorbion canariensis* communities, in Barranco de La Villa (San Sebastián de la Gomera), at 200 m a.s.l.; 14.I.1990 (TFC Mic. 7151), *Leg. G. Rutteb*. This species has previously been mentioned to the Canary Islands (WILDPRET *et al.*, 1973 [P]; RODRÍGUEZ-ARMAS *et al.*, 1988 [C, T]; BELTRÁN TEJERA *et al.*, 1989 [H]); on this occasion we give it as new to Gomera. *P. impudicus* is somewhat nitrophilous and can also be terricolous or psammophilous, or growing on decaying wood; widespread in Europe, America, Asia, Java, Sri Lanka, Japan. Records for South Africa are rather doubtful in the opinion of BOTTOMLEY (1948), because she examined specimens from several localities and considered them to be probably *P.rubicundus*, not *P.impudicus*. It is very common in the Iberian Península (Spain and Portugal), and the Balearic Islands (CALONGE, 1996).

Another species of *Phallus* recorded for the Canary Islands is *Phallus canariensis*. This is a questionable taxon described by MONTAGNE (1840) based on material collected in Gran Canaria in the past century by Dèspreaux, but it has not been seen since, therefore its presence is doubtful. This species has been assimilated to *Phallus rubicundus* (Bosc) Fr., a taxon extremely variable in size, shape and especially in colour (finely rugulose pileus and buff, orange or red stalk) and probably this is the reason for so many synonyms. It tends to have a tropical and subtropical distribution. The only record for Europe (Cáceres, Spain) was given by CALONGE *et al.* (1992). It cannot be included in the Canarian checklist of fungi.

Sclerodermatales:

Scleroderma cepa Pers., *Syd. Meth. Fung.*: 155. 1801.
HABITAT AND DISTRIBUTION: Two specimens were found growing on subhumid grassy soil at El Esquinzo ("Casa Sick", Jandía, Fuerteventura), 30 m a.s.l.; 2.II.1989 (TFC Mic. 7172), *Leg. Stephan Scholz*. It is a new record to Fuerteventura. It has been mentioned before for Tenerife (ECKBLAD, 1975), and Gran Canaria (BAÑARES, 1988). *S.cepa* is known in SW and S Africa, N America and Europe (DISSING & LANGE, 1962); widespread in the Mediterranean Region, common in Portugal and mainly the Northern half of Spain. It is very similar to *S. bovista*, another species mentioned for the Canary Islands, having reticulate spores while *S. cepa* has warty spores.

Tulostomatales:

Battarrea stevenii (Lib.) Fr., *Syst. Mycol.* 3: 7. 1832.
HABITAT AND DISTRIBUTION: On soil in xerophytic habitat at 150 m a.s.l., 28RFT 49452332 (Arrieta, Lanzarote), where the vegetation is represented by a degraded brushwood of *Euphorbia obtusifolia* Poir., *Launaea arborescens* (Att.) Murb., *Salsola vermiculata* L., etc., in the inframediterranean bioclimatic level; 2.XII.1993 (TFC Mic. 6629), *Leg. Alfredo Reyes Betancort*. Another specimen was found in Fuerteventura, growing in the *Euphorbia balsamifera* Poir. community, in similar habitat and bioclimatic level, at 200 m a.s.l., 28RES 60490685 (Bco. de Las Damas, Jandía Natural Park); 11.V.1996 (TFC Mic. 8062), *Leg. E.Beltrán Tejera, M.C.León Arencibia, A.García Gallo & S.Sholz*. This species was already known from Tenerife (MORENO & BELTRÁN TEJERA, 1975), Gran Canaria and Hierro (BAÑARES & BELTRÁN TEJERA, 1987). It is a new record to Lanzarote and Fuerteventura.

B.stevenii normally grows on sandy-earthy soils of desertic and arid zones, sometimes under marine influence. It is widespread throughout the tropics and subtropics (DRING, 1964). In the Mediterranean area, Hungary, Community of Independent States (C.I.S., formerly U.S.S.R.), Mongolia, Pakistan, America, Africa, Australia (DRING & RAYNER, 1966). It has been mentioned for Spain (CALONGE, 1990), but not yet known in Portugal according to CALONGE & ALMEIDA (1992) in their Gasteromycetes checklist for that country, and CALONGE (1996).

Phellorinia herculeana (Pallas.: Pers.) Kreisel, *emend* Demoulin, *Taxon* 22 (1): 98, 1973. HABITAT AND DISTRIBUTION: On stony soil in xerophytic habitat at 200 m a.s.l., SW, among shrubs of *Euphorbia obtusifolia* Poir., *Kleinia neriifolia* Haw., etc. at Lomo de Muley (Macizo de Betancuria, Fuerteventura); 28.XII.1989 (TFC Mic. 7153), *Leg. J.M.Torres Cabrera.* Another two specimens growing on subhumid grass-soil at El Esquinzo ("Casa Sick", Jandía Natural Park, Fuerteventura), 30 m a.s.l. 28RES 64400590; 2.IV.1989 (TFC Mic. 7154), *Leg. Stephan Scholz*. It was also found on the islet of La Graciosa (near Lanzarote), on sandy soils, at 5 m a.s.l.; 20.II.1995 (TFC Mic. 7089), *Leg. W.Wildpret, M. del Arco & A.García Gallo*; and Alegranza (Caldera de Alegranza), the northernmost islet of the archipelago, at 20 m a.s.l., on soil in xerophytic and nitrophilous habitat; 29.IV.1997 (TFC Mic. 8063), *Leg. T.Moro*. This species has been mentioned before for the islet of Lobos (WILDPRET & BELTRÁN TEJERA, 1974), and Lanzarote (RODRÍGUEZ-ARMAS *et al.*, 1988). Now we report it as new to Fuerteventura, La Graciosa and Alegranza.

The specimens studied here were found in the xerophytic-arid area but on unusual substrates, as it is normally a psamophilous species, distributed through Africa, SW United States, Australia, Central Europe and the Mediterranean Region (DRING, 1964). It is hardly represented in Spain, where it has only been reported for Zaragoza (MARTÍN & ROCABRUNA, 1989; *in* CALONGE, 1996), La Rioja (CALONGE *et al.*, 1992; *in* CALONGE, 1996), and Ribatejo, Portugal (CALONGE & ALMEIDA, 1992).

Tulostoma Pers.: Pers.

The finding of three species of *Tulostoma* new to the Islands is an interesting addition to the catalogue. It confirms, after reviewing the literature, the close relationship with the mediterranean mycobiota since all the Canarian species are also found in other Southern European countries, especially in the Iberian Peninsula where this genus is represented by seventeen species (CALONGE & WRIGHT, 1992).

KEY TO SPECIES OF THE GENUS *TULOSTOMA* PRESENT IN THE CANARY ISLANDS

1. Ostiole definite 2
1. Ostiole indefinite, fimbriate . . . . ***T. fimbriatum***
2. Ostiole tubular 3
2. Ostiole circular 4
3. Exoperidium hyphal. Peristoma around the ostiole concolous with the endoperidium, or sometimes darker . . . . ***T.melanocyclum***
3. Exoperidium membranous. Peristoma darker than the endoperidium . ***T.brumale***
4. Spore-sac up 26 mm. Ostiole circular not projecting or very slightly so. Base of stipe swelling like a pseudovolva . . . . ***T.macrocephalum***
4. Spore-sac up 18 mm. Ostiole circular, prominent. Base of stipe no swelling . . . . ***T.giovanellae***

Tulostoma fimbriatum Fr., *Syst. Mycol.* 3: 1169. 1821.
DESCRIPTION: Basidiomata stipitate, head globose, 0.8-1.8 cm diam.; exoperidium composed of hyphae mixed with soil, persistent around the collar which is membranous and subsplit at the base into several slender scales; endoperidium almost white to slightly cinereous. Ostiole irregular, fimbriate. Stipe to 4-6 x 0.4-0.6 cm, brownish, fibrous-striate, with somewhat spiralled fine striae; no trace of volva in mature specimens. Capillitium hyaline, branched, slightly thick-walled, (-2.4)-5-6-(-9) μm diam. Spores irregular-globose, 4.3-6.5 μm diam., warty to spiny (Fig. 1,3).
HABITAT AND DISTRIBUTION: At the moment all localities where the species has been found belong to Tenerife, with a broad altitudinal distribution: On soil in Teno Bajo, Barranco de Los Orabales, in arid habitat at 50 m a.s.l., the inframediterranean bioclimatic belt, in *Aeonio-Euphorbion canariensis* communities; 12.II.1978 (TFC Mic. 7170), *Leg. G.Finschow*. On volcanic sand ("lapilli") in El Portillo de la Villa (Las Cañadas), xerophytic habitat at 2050 m a.s.l., where the vegetation is represented by *Spartocytision nubigeni* communities (Canary high mountain broom brushwood), in the supramediterranean bioclimatic belt; 6.I.1994 (TFC Mic. 7169), *Leg. C. Rodríguez Piñero*. It was also found in communities of *Euphorbia atropurpurea* (Brouss.) Webb & Berth. and *Retama raetam* (Forssk.) Webb & Berth. in the dry thermomediterranean belt at Masca, 900 m a.s.l.; 3.III.1995 and 21.IV.1995 (TFC Mic. 7171, 7177), *Leg. C. Samarín, A. Vera Galván & R. Mesa.* According to CALONGE & WRIGHT (1989), *T. fimbriatum* grows on sandy soils in temperate regions, both in littoral and continental localities, widespread in Europe and very common in Spain (CALONGE, 1996). It is a new record to the Canaries.
TAXONOMIC REMARKS: A very polymorphic species showing variable macro- and microscopic characters. In WRIGHT's (1987) opinion this complex needs taxonomic revision.

Tulostoma giovanellae Bresad., Fungi Tridentini: 63, 1881.
HABITAT AND DISTRIBUTION: On soil in xerophytic habitat at 75 m a.s.l., where the vegetation is represented by scrubs of *Launaea arborescens*, *Salsola vermiculata*, etc., in La Caldera (in Alegranza islet); 2.V.1990 (TFC Mic. 7164), *Leg. J.L. Rodríguez Luengo.* Two additional specimens growing on humid soil of a "gavia" (La Oliva, Fuerteventura); at 200 m a.s.l.; 2.I.1990 (TFC Mic. 7167), *Leg. J.M. Torres Cabrera.* It was previously mentioned for Lobos islet (ECKBLAD, 1975). Now we report it as new to Alegranza.

It is a typical mediterranean species growing in sandy soils of the littoral dunes, but also distributed in Hungary, C.I.S. (former U.S.S.R.) and C Africa. It is represented in the mediterranean littoral of the Iberian Peninsula, and in some inland provinces (CALONGE & WRIGHT, 1989), Menorca (Balearic Islands) and Portugal (*s.auct. in* CALONGE, 1996).

Tulostoma macrocephalum Long, *Mycologia* 36: 337, 1944.
DESCRIPTION: Basidiomata stipitate, head globose, 1.8-2 cm diam.; exoperidium thin, composed of hyphae mixed with sand in its lower third; endoperidium whitish-beige, papyraceous; collar more or less deep and membranous. Ostiole circular, rarely ellipsoidal, flat or somewhat projecting over the surface of the endoperidium. Stipe whitish, 5-6 x 1-1.3 cm, stout and woody, scaly and longitudinally furrowed, finally the scales slough off, lightly attenuated towards the base, a swelling like a pseudovolva mixed with sand. Capillitium hyaline, branched, lightly thick-walled, 4.5-6-(-7) μm diam.

Spores irregular-globose, 4.2-6 µm diam., minutely warty (Fig. 1, 4).
HABITAT AND DISTRIBUTION: On sand of littoral dunes in El Médano (Tenerife), 0 m a.s.l., in halo-psamophilous plant communities of the inframediterranean bioclimatic belt; 2.V.1993 (TFC Mic. 7168), Leg. *C. Carqué Concepción & E. Carqué Álamo*. New record for the Canary Islands.

T. macrocephalum grows on sandy soils of arid regions of America. It has been recorded in Spain by CALONGE & WRIGHT (1989), collected in littoral dunes of Alicante; and Zaragoza (CALONGE & MARTÍN, 1992; *in* CALONGE, 1996). ALTÉS, MORENO & WRIGHT (1992) have made a comparative study between West American specimens in Long's herbarium and Spanish ones. SW U.S.A. and S Argentina (Wright, 1987). It is a Canarian new record.
TAXONOMIC REMARKS: It seems very close to *T. volvulatum* Borsch. and *T. meristostoma* Long, both of which have smooth spores (WRIGHT, 1987 *in op.cit.*).

Tulostoma melanocyclum Bresad., *in* Petri, *Ann. Mycol.* 2: 415, 1904.
DESCRIPTION: Basiomata stipitate. The subglobose head, about 1-1.5 (-2) cm diam., having a small collar with a membranous ring split at the base into which fits the slender, hollow, woody stipe. Ostiole tubular, peristoma definite and concolous with exoperidium hyphal or sometimes darker than the rest of the endoperidium, which is sordid beige to ash grey, finally smooth or with very small granulations. Stipe to 6 cm (x 0.4-0.8 cm diam.), rugose to squamulous-fibrous, whitish-ochre, ending in a slight basal swelling with no trace of a volva in mature specimens. Capillitium hyaline, branched, thick-walled, 6-6.7 µm diam., swollen septa. Spores globose, 6.7-7.7 µm diam., lightly thick-walled, honey coloured, conspicuously warty to spiny, some forming ribs (Fig. 2, 1).
HABITAT AND DISTRIBUTION: *Tulostoma* species are generally terricolous, often on sandy soil of dry regions and exceptionally growing in mesophytic or more humid habitats. In our case, two samples were found on soil in a clearing of the humid laurelforest of Las Mercedes (Tenerife), 800 m a.s.l.; 1.XI.1994 (TFC Mic. 6843), *Leg. M. González*. This is a typical European species, recorded from several localities of the Mediterranean area [e.g. in Spain: Cádiz, Navarra and Toledo (CALONGE & WRIGHT, 1989); and Barcelona (CALONGE *et al.*, 1991; *in* CALONGEN, 1996)]. *T. melanocyclum* has also been mentioned in America and Asia (*op. cit.*). It is a new record for the Canaries.
TAXONOMIC REMARKS: Bibliographical descriptions (WRIGHT *et al.*, 1972; CALONGE & WRIGHT, 1989, etc.), agree in many features with the Canary collection, but not in the large size of both the spore head and stipe of our specimens. This species is close to *T.brumale* Pers.: Pers. (recorded for Lobos islet by WILDPRET *et al.*, 1972; and for Gran Canaria by BAÑARES BAUDET, 1988); but it is distinguishable by its larger size spores (3.8-6 µm in *T.brumale*), more heavily ornamented spores and exoperidium composed of hyphae (membranous in *T. brumale*). On the other hand, it could also be confused with *T. giovanellae* Bresad., but is different because the base of stipe is not swollen, smaller spores (3.6-5.8 µm) and ornamentation, and its ecology on sandy soil of littoral dunes.

Discussion and Conclusions

Seven species of Gasteromycetes are reported as new to the Canary Islands: *Myriostoma coliforme,Tulostoma fimbriatum,T.macrocephalum,T.melanocyclum,*

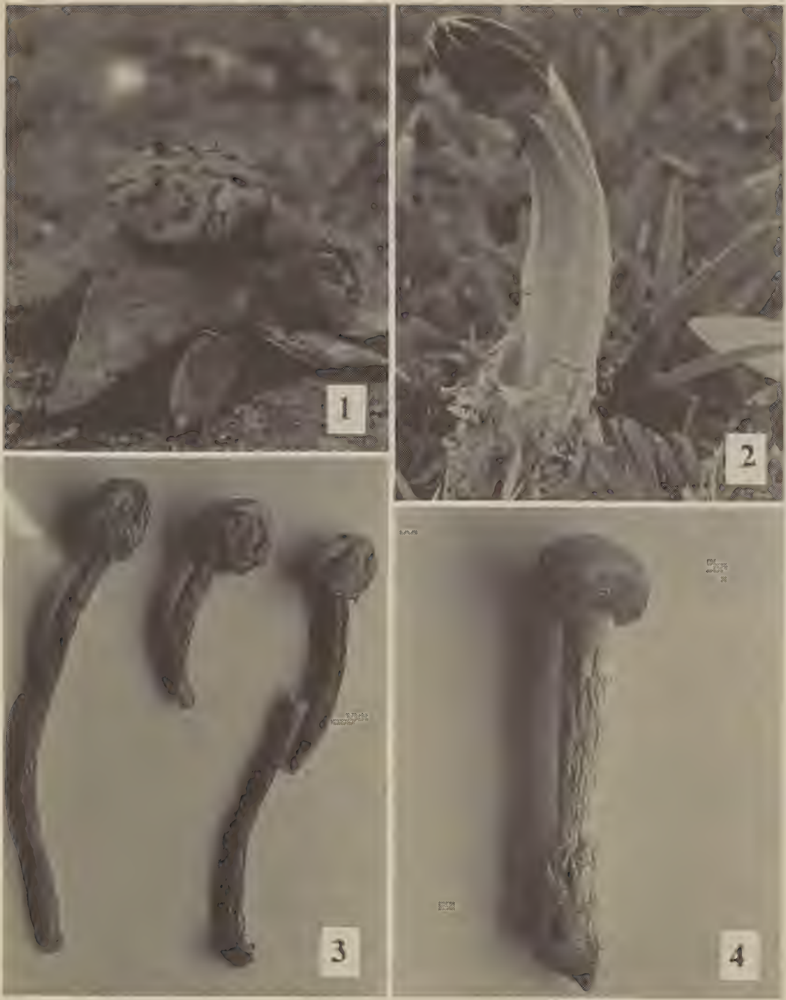

Fig. 1: 1. *Myristoma coliforme* (Dicks.: Pers.) Corda.; 2. *Lysurus mokusin* (Cibot: Pers.) Fr.; 3. *Tulostoma fimbriatum* Fr.; 4. *Tulostoma macrocephalum* Long.

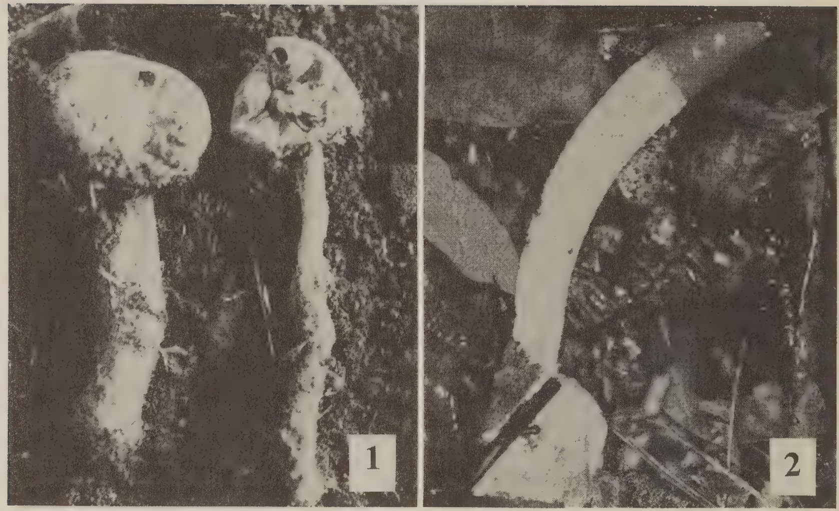

Fig. 2: 1. *Tulostoma melanocyclum* Bresad.; 2. *Mutinus caninus* (Huds.: Pers.) Fr.

Mutinus caninus, Lysurus cruciatus and *Lysurus mokusin*. Another seven *taxa* are given as chorological additions to some islands, though known previously from the other islands: *Cyathus olla, Sphaerobolus stellatus, Phallus impudicus, Scleroderma cepa, Battarrea stevenii, Phellorinia herculeana* and *Tulostoma giovanellae*.

Lysurus gardneri has been mentioned for Tenerife by WILDPRET & SANTOS (1972), based on the description and the drawings of PILAT (1958), who confused it with *Lysurus cruciatus* (Lepr. & Mont.) Lloyd, a mistake followed later by several authors. According to our discussion above, we must remove *L. gardneri* from the Canary fungal checklist and considerer *L. cruciatus* as new to the Canaries.

The *taxa* studied in this paper show a widespread world distribution: *Myriostoma coliforme, Cyathus olla, Sphaerobollus stellatus, Phallus impudicus, Scleroderma cepa, Battarrea stevenii* and *Phellorinia herculeana* are more or less cosmopolitan or subcosmopolitan species, while the remainder are limited to the Northern Hemisphere in the wide sense, mainly in temperate regions of Eurasia and America or in arid regions, e.g. *Tulostoma macrocephalum*. These data agree with the general origin of Canary Island Gasteromycetes. In fact, cosmopolitan distribution is the most representative chorological element in this group (about 34 %), followed by the holarctic element represented by a great number of species common to Europe (≈ 43 species), North America (≈ 35), and North Africa (≈ 31), (BELTRÁN TEJERA *et al.*, 1991). The distribution of *Mutinus caninus* and *Lysurus mokusin* is extended further south in the Northern Hemisphere.

According to the new bioclimatic classification of the Earth (RIVAS-MARTÍNEZ, 1993 *in* RIVAS-MARTÍNEZ *et al*., 1993), the macrobioclimate of the Canary Islands is mediterranean, in which are included three among the eight zonobioclimates of the world (mesophytic, xerophytic and desertic), and five Canarian ombrotypes (arid, semiarid, dry, subhumid, humid) among the seven distinguishable on the Earth. Six Gasteromycetes (*S. cepa, B. stevenii, P. herculeana, T. fimbriatum, T. macrocephalum* and *T. giovanellae*) studied here are xerophytic species, distributed between 0-2050 m a.s.l., and then in the infra, thermo and supramediterranean thermotypes, with arid, semiarid and dry ombrotypes, respectively. Some of them, e.g. *T. fimbriatum* has a broad altitudinal distribution (0-2050 m a.s.l.), but in approximately similar environmental conditions. On the other hand, four (*M. coliforme, S. stellatus, M. caninus* and *T. melanocyclum*) are mesophytic species, mostly growing in the thermomediterranean bioclimatic belt (subhumid and humid ombrotypes); and three (*C. olla, L. mokusin* and *P. impudicus*), have wide ecological value, being xero-mesophytic species.

With regard to substrate, all the Gasteromycetes studied, except the obligate lignicolous *Sphaerobolus stellatus*, are terricolous species, or facultative terri-lignicolous such as *C. olla, M. caninus* and *P. impudicus. T. macrocephalum* is a typical psammophilous species and terri-psammophilous species are *B. stevenii, P. herculeana* and *T. giovanellae.* Finally, *Myristoma coliforme, Lysurus mokusin, Mutinus caninus, Phallus impudicus* and *Cyathus olla* have more or less nitrophilic behaviour.

CHECKLIST OF THE GASTEROMYCETES OF THE CANARY ISLANDS[1]

Astraeus hygrometricus (Pers.) Morg. **C, T, G, P**
Battarrea stevenii (Lib.) Fr. **L* F*, C, T, H**
Bovita aestivalis (Bond.) Demoulin **C, T**
    (*Lycoperdon aestivale* Bon; *Bovista dakotensis* (Brenckle) Kreisel; *B.polymorpha* (Vitt.) Kreisel; *B.pusilliformis* (Kreisel) Kreisel; *Lycoperdon coloratum* Peck)
Bovista dryina (Morgan) Demoulin **T**
    (*Bovista colorata* (Peck) Kreisel; non *L.coloratum* Peck)
Bovista delicata Berk & Curtis **C**
Bovista dermoxantha (Vitt.) De Toni **C, T**
    (*Lycoperdon dermoxanthum* Vitt.; *L.ericetorum* Pers.; *Bovista pusilla* (Batsch) Pers.; *Lycoperdon pusilllum* Batsch)
Bovista ochrotricha Kreisel **T**
Bovista plumbea Pers.: Pers. **C, T, G, H**
Calvatia candida (Rostk.) Hollos **T**
    (*Langermannia candida* Rostk)
Calvatia cyathiformis (Bosc.) Morgan **C, T**
    (*Lycoperdon cyathiforme* Bosc.; *Calvatia lilacina* (Berk. & Mont.) Henn.)
Calvatia utriformis (Bull.: Pers.) Jaap **T**

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[1] A: Alegranza; LG: La Graciosa; L: Lanzarote; LB: Lobos; F: Fuerteventura; C: Gran Canaria; T: Tenerife; G: Gomera; P: La Palma; H: Hierro(* new record; species names that are new records are written in **bold**.)

Clathrus ruber Micheli: Pers. **T**
Colus hirudinosus Cav. & Sech. **T, G**
Crucibulum laevis (Huds. ex Relh.) Kambly **C, T**
Cyathus olla Batsch: Pers. **F*, T, G*, H**
Geastrum campestre Morgan **T, H**
Geastrum coronatum Pers.: Pers. **T**
Geastrum fimbriatum (Fr.) E.Fischer **T, P**
    (*Geastrum sesile* (Sow.) Pouz.)
Geastrum fornicatum (Huds. ex Winch. et al.) Hooker **H**
Geastrum minimum Schwein. **T, H**
Geastrum rufescens Pers.: Pers. **T**
Geastrum triplex Jung **T, G, P**
Gyrophragmium dunalii (Fr.) Zeller **LG, T**
Hydnangium carneum Wallr. **C, T, G**
Hymenogaster maurus Maire **T**
Lycoperdon atropurpureum Vitt. **C, T**
    (*Lycoperdon decipiens* Dur. & Mont.)
Lycoperdon lambinonii Demoulin **C, T, H, P**
Lycoperdon lividum Pers. **L, C**
Lycoperdon perlatum Pers.: Pers. **C, T, G**
Lycoperdon umbrinum Pers.:Pers. **C**
*** *Lysurus cruciatus* (Lepr. & Mont.) Lloyd. T***
*** *Lysurus mokusin* (Cibot: Pers.) Fr. T***
Montagnea arenaria (DC.) Zeller **LG, L, F, C, T**
*** *Mutinus caninus* (Huds.: Pers.) Fr. P***
Mycenastrum corium (Guers. ex Lamb. & DC.) Desv. **H**
*** *Myriostoma coliforme* (Dicks.: Pers.) Corda T***
Phallus impudicus L.: Pers. **C, T, H, G*, P**
Phlebogaster laurisylvicola Fogel T
Phellorinia herculeana (Pallas.: Pers.) Kreisel, *emend* Demoulin **A*, LG*, L, LB, F***
    (*Phellorinia delestrei* (Dur.: Mont.) E. Fischer)
Pisolitus tinctorius (Mich.: Pers.) Coker & Couch **C, T, G, H, P**
    (*Pisolithus arhizus* Raush.: Pers.)
Rhizopogon luteolus Fr. **C, T, H, P**
Rhizopogon vulgaris (Vitt.) M. Lange **C, T, G, H**
Scleroderma bovista Fr. **T**
Scleroderma cepa Pers. **F*, C, T**
Scleroderma citrinum Pers. **T**
    (*S.aurantium* auct. non L. trans Pers.; *S. vulgare* Fr.)
Scleroderma polyrhizum J.F. Gmel.: Pers. **C, T, G, P**
    (*Scleroderma geaster* Fr.)
Scleroderma verrucosum Bull.: Pers. **T**
Sphaerobolus stellatus Tode: Pers. **T, G***
Tulostoma brumale Pers.: Pers. **F, LB, C**
*** *Tulostoma fimbriatum* Fr. T***
Tulostoma giovanellae Bresad. **A*, F*, LB**
*** *Tulostoma macrocephalum* Long T***
*** *Tulostoma melanocyclum* Bresad. T***

Vascellum pratense (Pers.: Pers.) Kreisel **T**
(*Lycoperdon pratensis* Pers.)

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NEW AND INTERESTING SPECIES OF THE LICHEN GENUS *PERTUSARIA* FROM SOUTHERN SOUTH AMERICA

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Abstract: The following two new lichen species are described and illustrated: *Pertusaria formosensis* Messuti & A.W. Archer from Argentina and *Pertusaria valdiviana* Messuti & A.W. Archer from Chile. *Pertusaria tropica* Vainio is recorded for the first time for Argentina.

INTRODUCTION

This paper is the third contribution in the revision of the genus *Pertusaria* in southern South America. One of new species was found among the interesting lichen flora of the north-east of Argentina in the Formosa Province and the other is from the south of Chile in Valdivia Province. In addition, *P. tropica* Vainio (Vainio 1901), a widely distributed tropical species, was recorded for the first time from the northeast of Argentina in Chaco Province. Anatomical and chemical studies follow standard methods (Messuti & Archer 1995).

RESULTS AND DISCUSSION

New species

Pertusaria formosensis Messuti & A. W. Archer sp.nov.

Thallus crustaceus, viridi-glaucus, fissuratus, superficies leviter rugosus; prothallus niger; soredii et isidii desunt; corticola; apothecia verruciformia, numerosa, dispersa vel aggregata, raro confluentia, thallo concoloribus, circum ostiola e pallidulus aurantiacus luteosus, usque ad 0.8 mm in diametro; ostiola insconspicua, hyalina usque ad pallidula luteosa, punctiformia usque ad nonnihil mammiformia, in verrucis 1-3nae; asci cylindrici, 160-360 µm longae, 30-40 µm latae; sporae 8nae, ellipsoideae usque ad ovoideae, biseriatae vel sub-biseriatae, laeves, raro leviter ornatae, 40-80 µm longae, 24-36 µm latae.

Thallus K, C, KC, Pd non reagens; acidum thiophaninicum in magna summa et acidum 2'-*O*-methylperlatolicum et acidum 2'-*O*-methyldivaricaticum in minima summa continens .

Type: ARGENTINA, Formosa Province, Formosa Dept., ca. 10 km from Guaycolec Reserve, on route 11 towards Paraguay, 16.xi.95, *Messuti & Ferraro*, BCRU 01786 (holotype). Isotype: BCRU 01787, NSW.

Thallus crustose, greenish glaucous, cracked, surface slightly wrinkled; *prothallus* black; lacking isidia and soredia; corticolous; **apothecia** verruciform, numerous, scattered or crowded, sometimes confluent, concolorous with the thallus, with a moderate orange-yellow colour around the ostioles, to 0.8 mm diam.; ostioles inconspicuos, hyaline to pale yellow, punctiform to somewhat mammiform, 1-3 per verrucae; *asci* cylindrical, 160-360 µm long, 32-40 µm wide; **spores** 8 per ascus, ellipsoid to ovoid, biseriate or subseriate (arranged longitudinally, with the apical end touching the distal end), smooth, sometimes slightly ornamented, 40-80 µm long, 24-36 µm wide, spore wall 4-6 µm thick.

Chemistry: K-, C-, KC-, Pd-. TLC and HPLC: thiophaninic acid (major), 2'-*O*-methylperlatolic acid (minor) and 2'-*O*-methyldivaricatic acid (minor).

Additional specimens examined: ARGENTINA, Formosa Province, Formosa Dept., ca. 10 km of Guaycolec Reserve, on route 11 towards Paraguay, *Messuti & Ferraro*, 16.xi.95, BCRU 01788, NSW.

Pertusaria formosensis (Fig.1) is characterized by verruciform conical apothecia; insconspicuos ostioles sometimes mammiform; cylindrical asci; eight biseriate spores, with a smooth or rarely slightly striate wall. The new species resembles morphologically *Pertusaria araucaria* Müll. Arg. described from Brazil (Müller 1884), and the widely distributed *Pertusaria leioplacella* Nyl. (Malme 1936). However, *P. formosensis* is distinguished from these two species by the chemistry: *P. araucaria* contains thiophaninic and 2-*O*-methylperlatolic acid, and *P. leioplacella* contains thiophaninic and stictic acid (Archer 1991), usually with hypostictic acid. The new species has a similar chemistry to that *Pertusaria cinerella* Müll. Arg. a two spored species distributed in Uruguay and Argentina (Malme 1936; Müller 1888).

Etymology: The epithet *formosensis* is derived from the name of the political area (Formosa Province) where the species was found for the first time.

Habitat: The species grows on the bark of woody legumes in the phytogeographical area named Chaqueña Province (Cabrera 1994).

Pertusaria valdiviana Messuti & A.W. Archer sp. nov.

Thallus crustaceus, cremeus usque ad bubalinus vel viridi-glaucus, continuus usque ad fissurates, superficies rugosus; soredii et isidii desunt; corticola; apothecia verruciformia, plano-hemisphaerica, immersa, pseudolecanorina, numerosa, dispersa vel aggregata, thallo concoloribus, usque ad 1.2 mm in diametro ostiola nigra, conspicua, in verrucis 1-5 (-7)nae; usque ad 0.3 mm in diametro; asci claviformi, 240-396 µm longae, 48-80 µm latae; sporae 8nae vel 4-nae, ellipsoideae usque subfusiformes, asymmetricae, rectae vel nonnihil curvae, laeves, biseriatae, (80-) 96-140 µm longae, 24-45 µm latae; parietibus 4-8 (-12) µm latae, raro halonatae, halos 8-28 µm latae.

Thallus K non reagens vel K pallido luteus, C non reagens, KC non reagens, UV non reagens vel UV pallido luteus usque ad vivido luteus; lichexanthona continens.

Type: CHILE, Valdivia Province, Valdivia Dept., on slope above río El Lingue, between Mehuín and Lleco, *Imshaug* 42844, 11.IX.69, BCRU 01789 ex MSC (holotype).

Thallus crustose, cream-coloured to buff (pale yellow) or greenish glaucous, continuous to cracked, surface rugose to wrinkled, soredia and isidia lacking; corticolous; **apothecia** verruciform, flattened hemispherical, sunken, pseudolecanorine, numerous, scattered to crowded, concolorous with the thallus, to 1.2 mm diam.; ostioles black, conspicuous, 1-5 (-7) per verruca, to 0.3 mm diam, with irregular and gross margin; **asci** claviform, 240-396 µm long, 48-80 µm wide; **spores** 8 per ascus, rarely 4 per ascus, ellipsoid to subfusiform, asymmetric, straight or slightly curved, biseriate, smooth, (80-) 96-140 µm long, 24-45 µm wide, spore wall 4-8 (-12) µm wide, sometimes halonate, halo 8-28 µm wide.

Chemistry: K- or K+ weak yellow, C-, KC-, UV- or UV+ (360 nm) weak yellow or UV+ (254 nm) bright yellow. TLC: lichexanthone.

Additional specimens examined: CHILE, Valdivia Province, Valdivia Dept., Jardín Botánico de la Universidad Austral de Chile, *Messuti*, 18.X.95, BCRU 01790, NSW.

Pertusaria valdiviana (Fig.2) resembles *Pertusaria phaeostoma* Müll. Arg (Müller 1884a). Both species have similar morphological and chemical features: conspicuous dark ostioles; eight biseriate spores per ascus (but the spores in *P. valdiviana* are slightly smaller than those in *P. phaeostoma*) and both species contain lichexanthone as the only lichen compound. The species differs, however, in the number, form and colour of the ostioles. *Pertusaria phaeostoma* has a single large dark brown, pseudolecanorine ostiole in contrast to the several smaller black ostioles present in *Pertusaria valdiviana*.

Etymology: The specific epithet refers to the region where the species occurs.

Habitat: No information was given on the herbarium label with the holotype but from the locality it is possible that the substrate was a *Nothofagus* species. The second specimen was growing on the bark of a *Fraxinus* species. The species occurs in well shaded forest with a high humidity.

New reports

Pertusaria tropica Vain., Cat. Welw. Afr. Pl. 2: 404 (1901).
Pertusaria bengalensis Vain., Hedwigia 46: 169 (1907).
Pertusaria pulcheretincta Zahlbr., Ann. Crypt. Exot. 1: 191 (1928), *vide infra*.

Thallus crustose, off-white to greyish white, continuous or slightly areolate and craked, surface wrinkled to tuberculate; lacking isidia and soredia; corticolous; **apothecia** disciform, sessile, sometimes columnar, numerous and crowded, at times fussed (2-3 (-4)) and mutually deformed by compression, to 0.8 (-1.1) mm diam.; discs red, white pruinose, with a margin smooth or irregular, concolorous with the thallus, sometimes sorediate (sterile); **asci** cylindrical-claviform to claviform, 240 µm long, 52 µm wide; **spores** 1 per ascus, smooth, sometimes with 10% KOH the surface of the spore wall seems to be rough (?corrugations), ellipsoid to cylindrical, 92-152 µm long, 36-56 µm wide, spore wall 6-8 µm thick.

Chemistry: Discs: K- or K+ red-orange, KC+ yellow-orange. TLC and HPLC: hypothamnolic acid. Other specimens examined, from Australia and Papua New Guinea give a K+ violet, KC+ wine red colour and contain hypothamnolic acid (major), sometimes with lichexanthone (major) and rarely lichesterinic acid (minor).

Material examined: ARGENTINA, Chaco Province, General Güemes Dept., El Quebrachal, *Popoff* 714, 30.III.90, (CTES).

Pertusaria tropica (Fig.3) is morphologically and chemically similar to *Pertusaria hypothamnolica* Dibben (Dibben 1980) which was later reported from Papua New Guinea (Archer *et al.* 1995). However, the examination of additional specimens from Papua New Guinea and Australia suggests that the original specimens from Papua New Guinea are *P. tropica*. *Pertusaria hypothamnolica* would have a markedly disjunct distribution if included as a synonym of *P. tropica*. In contrast to the well-defined tropical distribution of *P. tropica*, *P. hypothamnolica* is a subtropical to temperate species, from the south eastern United States, which does not occur below latitude 30ºS. Both of these species are distinguished from *Pertusaria novaezelandiae* (Szatala 1939), which also contains hypothamnolic acid, by the restricted temperate distribution (Australia and New Zealand) and the constant absence of lichexanthone in the latter species.
Pertusaria pulchretincta Zahlbr. is tentatively included as a later synonym of *P. tropica* on the basis of Zahlbruckner's description; he reported his specimens (from Java) to react K+ violet and the asci to contain a single spore.

Habitat and distribution: *Pertusaria tropica* is a tropical species distributed in Thailand, Indonesia, Papua New Guinea and Australia (Fig. 4) growing over bark of a large variety of plants. The species has also been reported from

Northern Rhodesia (Zambia) (Dodge 1964). In Argentina the species occurs in the north-east of Argentina, in the Chaco Province.

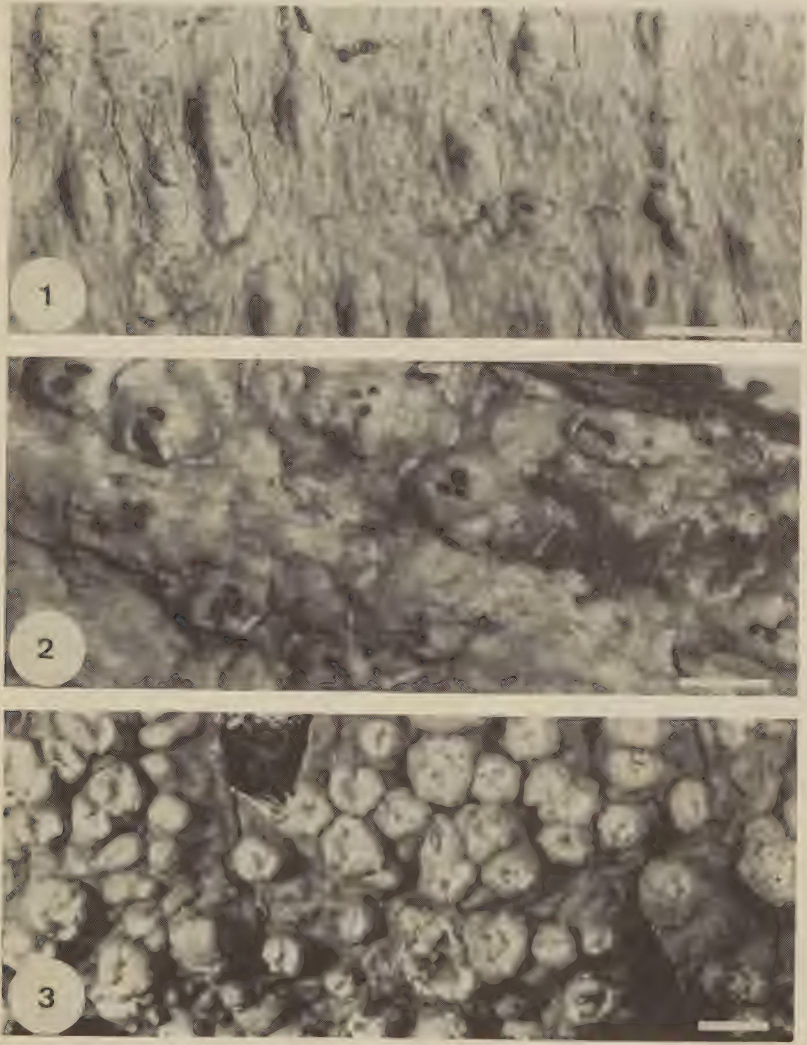

Figure 1-3. 1. *Pertusaria formosensis* (holotype). 2. *Pertusaria valdiviana* (holotype). 3. *Pertusaria tropica* (Popoff 714 CTES). Scale bar = 1mm.

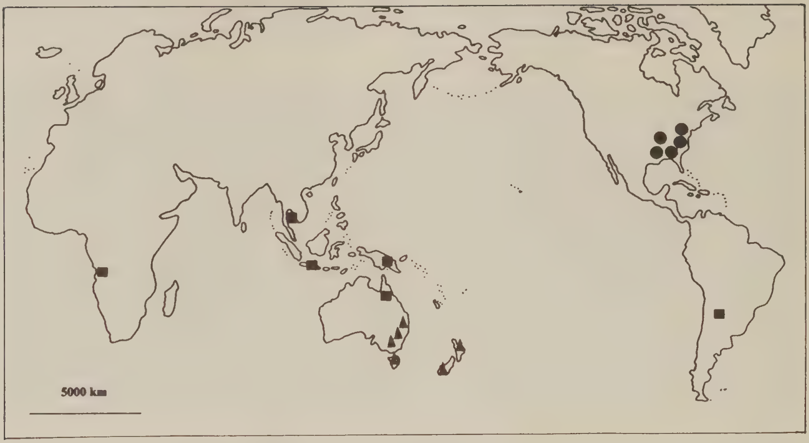

Figure 4. World distribution of *Pertusaria hypothamnolica* (●), *Pertusaria novaezelandiae* (▲) and *Pertusaria tropica* (■).

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NOMENCLATURAL VALIDATION OF *SOLUTOPARIES* (CHYTRIDIOMYCETES)

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ABSTRACT

Solutoparies is a distinct genus of Chytridiomycetes. However, the genus name *Solutoparies* Whiffen and the species name *Solutoparies pythii* Whiffen require nomenclatural validation. Both names are herein validated by provision of Latin diagnoses and citation of the type. The author citation of these names is now Whiffen ex Blackwell & Powell. The existence of a possible additional species of the monotypic genus *Solutoparies* is discussed.

INTRODUCTION

Using grass leaf bait placed in cultures of soil samples collected at Chapel Hill, North Carolina, Whiffen discovered, described, and named (1942) the chytrid genus *Solutoparies* (meaning "dissolving wall"). Whiffen (1942) simultaneously named and described the single species of the genus, *S. pythii,* parasitic on an undetermined species of *Pythium*. Whiffen also provided a description of this *Pythium* species in the same publication, but did not give it a name.

Solutoparies is a distinctive genus of chytrids based on a combination of: 1) freeing of zoospores by progressive dissolution of the zoosporangial wall, 2) zoospores swimming away individually, not as a group, from a surrounding gelatinous matrix, and 3) rhizoids that attach to but allegedly do not penetrate the host hyphae. *Solutoparies* would be a member of the order Chytridiales, family Rhizidiaceae, in classifications of Whiffen (1944), Sparrow (1960), and Karling (1977). Based on the uniguttulate zoospores (cf. Whiffen, 1942; Dogma, 1969), i.e., each zoospore apparently containing only one rather large oil droplet, the genus would tentatively be placed in the emended order Chytridiales, family Chytridiaceae, in Barr's (1980) outlined reclassification. Knowledge of the ultrastructural architecture of the zoospore, however, is necessary to clarify ordinal/familial placement in Barr's (1980, 1990) proposed reclassification.

In searching for possibly related genera, *Nowakowskia* Borzi has been stated to bear some resemblance to *Solutoparies* (Sparrow, 1960). *Nowakowskia*, however, has rhizoids that penetrate its host (*Hormotheca*), and zoospores swim away collectively (Sparrow, 1960; Karling, 1977), remaining attached to each other for a while. Also, the sporangium of *Nowakowskia* is not spiny, as it usually is in *Solutoparies*.

Solutoparies, a clearly circumscribed genus of chytrids, should be properly named. The names *Solutoparies* and *S. pythii* are both nomenclaturally invalid because Whiffen (1942) did not provide a Latin description or a Latin diagnosis for either name. The rule requiring either a Latin description or diagnosis, or reference to same, for valid publication came into force in 1935 (see ICBN, 1994). A parallel situation existed with Whiffen's genus *Septosperma*, described in the same (1942) publication, which also lacked Latin descriptors. Seymour (1971) later provided a Latin description for *Septosperma*, thus validating the genus; the citation then became *Septosperma* Whiffen ex Seymour. Seymour (1971) also validated two species of *Septosperma* with Latin, two others being subsequently validated by Milanez (1974); see Blackwell and Powell (1991) for full explanation. No Latin description has ever been provided for *Solutoparie*s, however, and it has remained an invalid name.

The purpose of our publication is to validate the generic name *Solutoparies* Whiffen and the species name *S. pythii* Whiffen (Whiffen, 1942). Validation is accomplished by providing a Latin diagnosis for each name and by stating the nomenclatural type. An appropriate author citation of *Solutoparies* and *S. pythii* would now be: Whiffen ex Blackwell & Powell, which gives deserved credit to Whiffen for recognition of the taxa. Below, we present in quotes, respectively for the genus and species, the verbatim (English) description provided by Whiffen (1942). Whiffen's original descriptions are followed by our revised English descriptions which are based on literature study and emphasize taxonomically distinctive features. Our English diagnostic descriptions are translated into Latin, constituting the Latin diagnoses.

In a monotypic genus, the decision as to which features to include under the genus description versus the species description is somewhat arbitrary. Our basis for this decision is derived from literature, especially Whiffen (1942), Sparrow (1960) and Karling (1977). Nomenclaturally, our descriptions should not be considered merely emendations of Whiffen's descriptions, but new descriptions, with the Latin diagnoses validating names (*Solutoparies* and its species). Although it is permissible (ICBN, 1994) to provide a combined Latin description of the genus and species, this is unwise should another species be described, or be overlooked by the present publication.

DESCRIPTION AND VALIDATION

Solutoparies Whiffen (1942), Mycologia 34: 543-557, *nomen non rite publicatum, sine diagnose latina.* (name not validly published, lacking Latin diagnosis)

"Thallus entirely extramatrical, monocentric. Sporangia developing by enlargement of zoospore; rhizoidal system much-branched. Spore discharge by dissolution of sporangial wall, liberating the zoospores which swim away singly. Zoospore uniguttulate, posteriorly uniciliate. Resting spores unknown."

Solutoparies, new genus, Chytridiomycetes, Whiffen ex Blackwell & Powell, diagnostic description.

Thallus interbiotic, eucarpic, monocentric. Rhizoidal system much branched. Sporangium inoperculate, developing by direct enlargement of the encysted zoospore. A portion of the sporangial wall often spiny. Zoospores uniguttulate, liberated by dissolution of the sporangial wall, swimming away singly.

***Solutoparies**, genus novum, Chytridiomycetarum*, Whiffen ex Blackwell & Powell, *diagnosis latina.* (Latin diagnosis)

Thallus interbioticus, eucarpicus, monocentricus. Systema rhizoideorum multum ramosum. Sporangium inoperculatum, per amplificationem directam e cysta *zoosporae evoluta. Paries sporangii saepe pro parte spinulosus. Zoosporae uniguttulatae, per parietem sporangii dissolvens solvuntur, singulariter ab natans.*

Solutoparies pythii Whiffen (1942), Mycologia 34: 543-557, *nomen non rite publicatum, sine diagnose latina.* (name not validly published, lacking Latin diagnosis)

"Thallus parasitic. Sporangia ovoid to spherical, 14.3 [µm] X 16.4 [µm] to 68.4 [µm] X 80.3 [µm] ; wall spiny, spines conical, up to 5 [µm] in length. Rhizoidal system cut off by cross wall from mature sporangium, tips of rhizoidal branches adhering to but not penetrating host hyphae. Dissolution of sporangial wall complete except for basal portion, freeing the spore mass, enclosed in a gelatinous matrix; zoospores separating as surrounding matrix dissolves, swimming away singly. Zoospores spherical, 4.5 [µm] to 5.6 [µm] , hyaline with single colorless oil globule. Resting spores unknown."

Solutoparies pythii, new species, Whiffen ex Blackwell & Powell, diagnostic description.

Thallus parasitic on *Pythium*. Rhizoidal branches merely adhering to hyphae of the host. Main rhizoidal axis becoming swollen, delimited from sporangium by cross-wall formation at a point of constriction. Sporangium with small conical spines except toward the base. Sporangial wall dissolving except for basal portion; the spinules dissolving more slowly than regions between the spinules.

Solutoparies pythii, *species nova*, Whiffen ex Blackwell & Powell, *diagnosis latina.* (Latin diagnosis)

Thallus ad Pythium parasiticus. Rami rhizoideorum ad hyphas hospitis tantum adhaerens. Axis primus rhizoideorum fit tumidus, per septum a sporangio ad constrictionem delineantur. Sporangium cum spinulis conicis praeter ad fundum. Paries sporangii praeter partem ad basem diffluens; spinulae postea quam areae inter spinulas dissolvens.

Typification of Genus and Species. Whiffen (1942) designated *Solutoparies pythii* as "the type species" of *Solutoparies*, as noted by Farr et al. (1979). Whiffen's designation would seemingly be sufficient typification of the genus. Technically, however, the type of the genus name *Solutoparies* would be the same as the type of the name of its only species, *S. pythii*. But Whiffen did not designate type material (specimen, slide, culture, etc.) of the species, nor any material that could be interpreted as the type. She was not required to do so for nomenclatural validation in 1942, because the rule requiring type designation did not come into place until 1958 (ICBN, 1994). However, we must do so now. Hence, the type of the name *Solutoparies* is the type of the name *S. pythii*. Because the type of *S. pythii* has not been heretofore assigned, and no original specimen material is available, we designate Whiffen's (1942) Figures 1-23 and 25-27 as the *typus* of this species name, and consequently of the generic name *Solutoparies*. Figure 24 is of the uninfected host (*Pythium*), and is not included in our type designation.

DISCUSSION

Sparrow (1960) cited no species of *Solutoparies* other than *S. pythii.* Dogma (1969) found what he interpreted as *Solutoparies* (in probable association with *Rhizophlyctis rosea = Karlingia rosea*) in cultures of soil and leaf litter samples taken near the University of Michigan Biological Station. Dogma provided a description and illustration of this organism, and tentatively placed it in Whiffen's *S. pythii*. Our examination of Dogma's Figures 50-56 supports his identification as *Solutoparies*; however, Dogma found putative resting spores (not found by Whiffen), and also observed that remains of zoosporangial spines persisted longer than noted by Whiffen. Karling (1977), in reference to Dogma's (1969) *Solutoparies*, noted that the primary rhizoidal (subsporangial) axis did not develop a swelling to the extent of *S. pythii*, and hence did not become as "apophysis-like" as in *pythii*; Karling felt that the chytrid found by Dogma was "possibly" a second species of *Solutoparies*. In our view, this *Karlingia* associated chytrid should be reisolated and studied before either definitely including it in *S. pythii* or establishing it as a separate species of *Solutoparies*. Additionally, we should mention that Dogma (1969) stated that Willoughby (1965) found a chytrid from Australian soil samples "probably indentical" to his (Dogma's) *Solutoparies*. As evidence, Dogma cited Willoughby's "monocentric sp. 2" and its illustrations, Figures 4 n-o. However, Willoughby's Figures 4 n-o may or may not be of *Solutoparies*. A greater superficial similarity to *Solutoparies* is actually seen in Figures 4 p-r, these stated by Willoughby to be of *Phlyctochytrium* sp.

A review of the Index of Fungi (Commonwealth Mycological Institute) revealed no additional names under *Solutoparies*. No new taxa of *Solutoparies* were listed by Longcore (1996), who reviewed chytridiomycete taxonomic literature since the date of publication of Sparrow's book (1960). Also, Barr (1990) did not mention the genus. Thus, *Solutoparies* remains officially monotypic, containing only a single nomenclaturally recognized species. To avoid erroneous terminations of any future epithets, we emphasize that *Solutoparies* is a name of masculine gender in Latin, based on "*-paries*," a masculine substantive of the third declension (Stearn, 1983). The gender of *Solutoparies* is not perceivable from the epithet, *pythii*, a genitive noun.

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CORTICIOID APHYLLOPHORALES (BASIDIOMYCOTA) FROM THE PATAGONIAN ANDES FORESTS OF ARGENTINA

3. THE GENUS *DENDROTHELE*

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Abstract

The species of *Dendrothele* v. Höhn. & Litsch. so far found in the southern forests of Argentina are described: *D. andinopatagonica* sp. nov., with large ellipsoid spores, *D. boidinii* sp. nov., with thick-walled encrusted hyphidia, *D. incrustans* (Lemke) Lemke, *D. lemkei* sp. nov., the only species exclusively found on fallen wood, never on bark, *D. pitrae* sp. nov., with cylindric, thin-walled and mid-constricted spores and *D. tuberculata* sp. nov., with 2-sterigmate basidia and tuberculate hymenial surface. They grow on one to several of the following species: *Nothofagus dombeyi*, *N. obliqua*, *N. pumilio*, *Maytenus boaria* and *Myrceugenella exsucca*.

Key words: Aphyllophorales, Corticiaceae, *Dendrothele*, *Nothofagus*, *Maytenus*, *Myrceugenella*

Introduction

Dendrothele v. Höhn. & Litsch. is a distinct genus within the Corticiaceae s.l., most of its species forming distinct crustose and patchy fructifications on the bark of living trees. Lemke (1964) and recently Boidin *et al.* (1996) have produced most valuable monographs for the study of these organisms. Schultz *et al.* (1996) demonstrated the production of esterases, probably related to suberine degradation, for several species in the genus. During the last years we have collected and studied many specimens on different endemic hosts of the Patagonian Andes forests in southern South America. In this work we present the results of this study.

Materials and Methods

Most specimens are kept at the authors' address laboratory but types and duplicates have been deposited at BAFC. Spores were measured in 5% aqueous KOH plus 1% phloxine and, in some cases, statistical measurements were made either from a spore print or from dried material. In those cases, N= number of measured spores, L = mean length, W = mean width. Common color names have been used along with in many cases, color notations according to Munsell (1990). In most cases, material was treated in 50 % HCl solution in order to dissolve crystals in the hymenium and context, prior to preparation of drawings. AG and MR refer to collections made by the first and the second authors, respectively.

Results

Key for the identification of the species

1 .Spores longer than 25 µm .... *D. andinopatagonica* sp. nov.
1'.Spores shorter than 25 µm 2

2 .Dendrophyses absent; unbranched hyphidia present .... *D. boidinii* sp. nov.
2'.Dendrophyses present, unbranched hyphidia absent 3

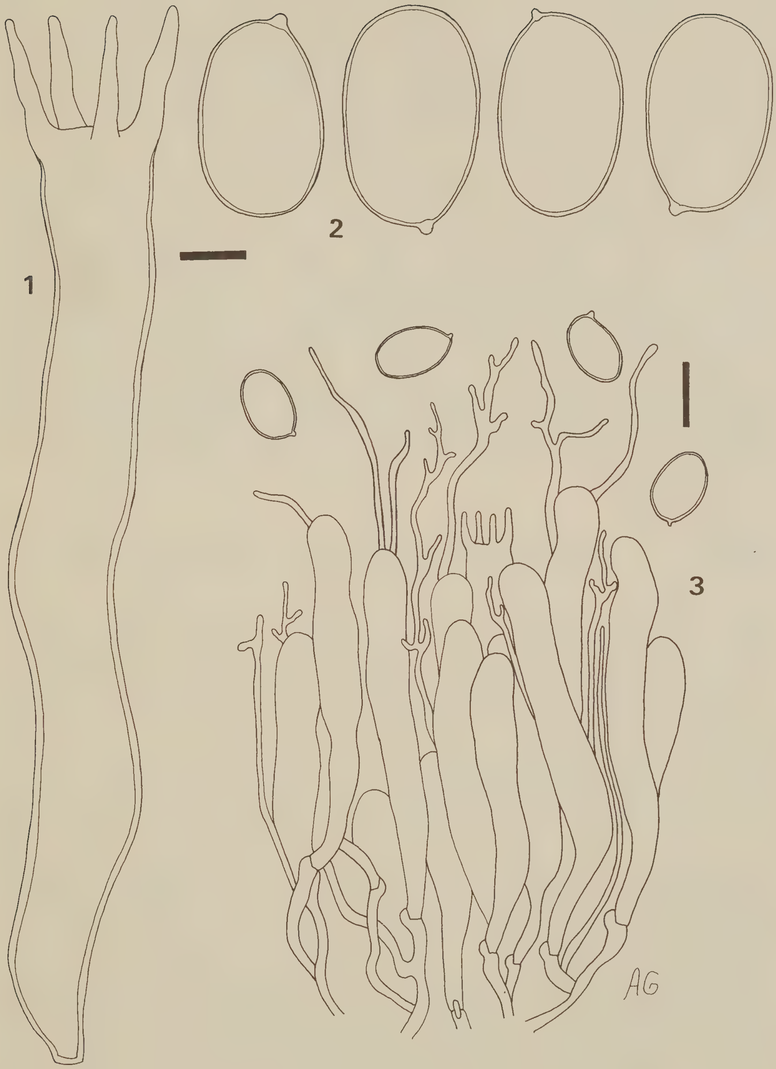
3 .Spores thin-walled, cylindric, slightly or distinctly allantoid, with a mid-constriction .... *D. pitrae* sp. nov.
3'.Spores slightly thick to thick-walled, ellipsoid to subglobose 4

4 .Basidia with 2 sterigmata .... *D. tuberculata* sp. nov.
4'.Basidia with 4 sterigmata 5

5 .Spores subglobose, 10-12 x 8-9 µm, on bark of living trees ....
.... *D. incrustans* (Lemke) Lemke
5'.Spores ellipsoid, 12-16 x 8-10 µm, on fallen wood .... *D. lemkei* sp. nov.

Dendrothele andinopatagonica Greslebin & Rajchenb. sp. nov. Figs. 1-3

Jacens, adnata, cretaceo-alba, rimosa, margine abrupta. Sectio 400-850 µm crassa, crystallis perabundantibus. Hyphae generatoriae fibulatae. Basidia cylindracea, 4-sterigmata, 100-170 x 12-17 µm. Basidiosporae ellipsoidea (24-)26-32(-36) x (15-)17-22(-24) µm, tunica incrassata. Dendrophyses perabundantes. Ad corticem Maytenus boaria et Nothofagus obliqua viventes. Holotypus BAFC 34517.



Figs. 1-3: *Dendrothele andinopatagonica*, microscopic features. 1. Basidia. 2. Spores. Bar 10 µm. 3. Section through hymenium. Bar 25 µm.

Fruitbody resupinate, adnate, chalky, forming small, scattered to numerous, circular to ellipsoid patches when young, afterwards coalescing or not, forming irregularly circular to ellipsoid patches up to 3.5 x 1.5 cm, 400-850 µm thick. Margin determinate, thick, blunt, regular, lobate or multilobate, white and adnate. Hymenial surface smooth, felty under the lens, with tuberculate aspect due to the irregularities of the substrate, rimose, pure white, whitish-cream, turning straw-colored in sporulating areas.

Hyphal system monomitic, with clamped generative hyphae, 3-4 µm in diam., with hyaline, thin to slightly thickened walls, obscured by abundant crystals.

Hymenium a catahymenium formed by basidia, basidioles and dendrophyses, obscured by heavy encrustation.

Basidia cylindric to subcylindric, clamped at base, with 4 sterigmata, 100-170 x 12-17 µm.

Basidioles variable in size and shape, cylindric to narrowly claviform, short or long, 50-190 x 11-15 µm, with hyaline, thin or up to 1 µm thick walls.

Dendrophyses abundant, branched and simple, clamped at the base and strongly encrusted.

Cystidia absent.

Basidiospores ellipsoid, (24-)26-32(-36) x (15-)17-22(-24) µm, with a distinct apiculus, with hyaline, IKI -, cyanophilous, 0.8 µm thick walls.

Habitat: On the exposed, external or internal surface of the bark of living *Maytenus boaria* (Celastraceae, Sapindales), rarely on dead standing trees. Also rarely recorded on the bark of living *Nothofagus obliqua* (Fagaceae).

Material studied (host of all specimens is *M. boaria*, except for MR 11198-*N. obliqua*): Argentina, Chubut, Futaleufú, Los Cipreses, Estancia "La 106", leg. MR 10807, 23.Feb.94 (BAFC 34517, Holotype). Los Cipreses, Puerto Ciprés camping area, leg. MR 10907, 10908, 10909, 10910 and 10911, 18.Dec.94. Los Cipreses, Puerto Ciprés camping area, leg. MR 10997 (BAFC 34518) and MR 10998, 9.Jun.95. Los Cipreses, Estancia "La 106", leg. MR 11061, 14.Nov.95. Los Cipreses, Estancia Pehuén, leg. MR 11268, 18.Jun.97. Chubut, Los Alerces National Park, Lake Futalaufquen, Bahía Rosales, leg. MR 10915, 20.Feb.95. Los Alerces National Park, Lake Futalaufquen, Puerto Limonao, leg. MR 11074, 17.Feb.96. Lake Futalaufquen, Puerto Limonao, leg. MR 11192, 26.May.96. Los Alerces National Park, Bahía Rosales, leg. MR 11209, 2.Mar.97. Los Alerces National Park, Mt. Dedal, leg. MR 11277 and 11278, 9.May.97. Neuquén, Lanín National Park, Lake Lácar, leg. MR 11104 and 11105, 28.Apr.96. Neuquén, Lanín National Park, Yuco Alto, leg. MR 11198, 8.Oct.96. Río Negro, San Carlos de Bariloche, km 6 Los Pioneros Ave., Rancho Grande, leg. AG 1083, 23.May.97.

Etymology: *Dendrothele andinopatagonica* refers to the geographical area, *viz*. the Patagonian Andes, where the species is found.

Remarks: The species is distinct on account of its large, ellipsoid spores and huge basidia. *Dendrothele macrodens* (Coker) Lemke differs in producing spores that are smaller, narrower and rectangular, (17-)19-23(-29) x 11-18 µm and thinner fruitbodies, 100-150(-200) µm thick. *Dendrothele strumosa* (Fr.) Lemke differs by its globose-subglobose spores, 22-24(-27) x 19-23 µm, the presence of gloeocystidia and vesicles in the context, and the bright golden-yellow hymenial surface.

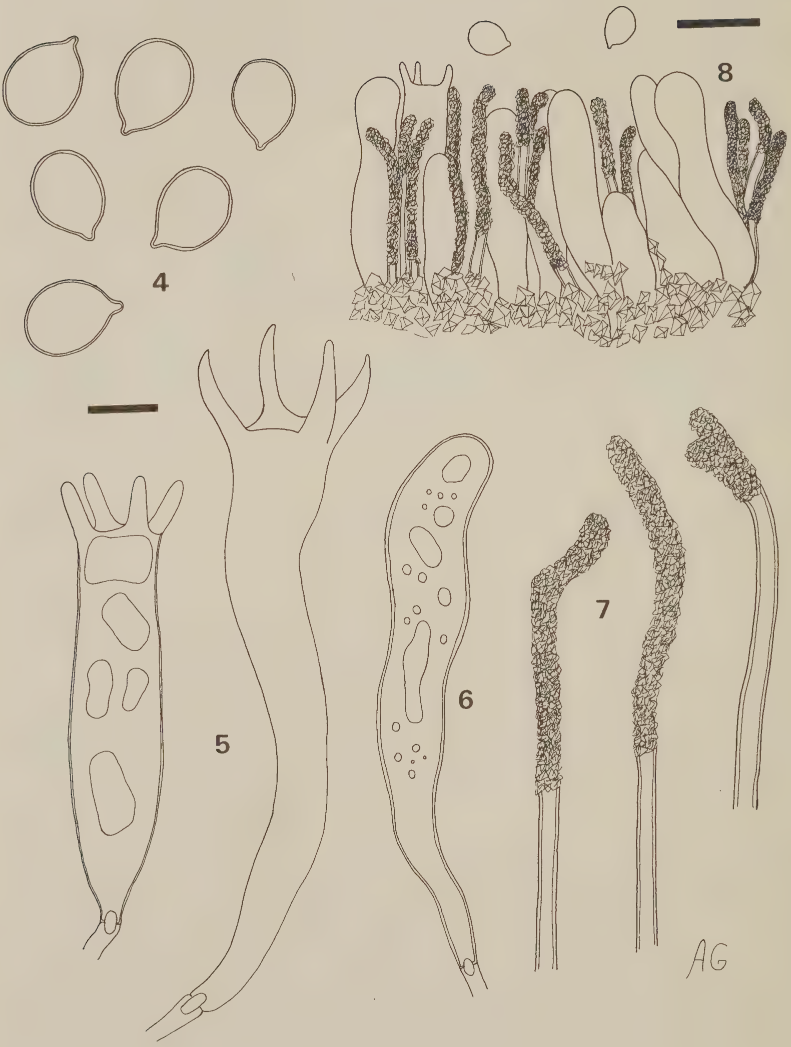
Spore measurements:

Specimens	N	L ± σ (µm)	W ± σ (µm)	L/W
MR 10997	30 (spore print)	28.70 ± 2.50	18.90 ± 1.50	1.52
MR 10998	30 (spore print)	29.50 ± 2.80	19.20 ± 1.70	1.53
MR 10997	33 (herb. mat.)	27.28 ± 1.42	17.12 ± 1.20	1.59
MR 10998	30 (herb. mat.)	29.65 ± 1.73	18.14 ± 1.23	1.63
MR 10807	15 (herb. mat.)	27.75 ± 1.75	17.60 ± 1.20	1.58
MR 11198	30 (herb. mat.)	27.65 ± 2.05	17.65 ± 1.35	1.56

Dendrothele boidinii Greslebin & Rajchenb. sp nov. Figs. 4-8

Jacens, adnata, laevis vel tuberculata, grisea vel leviter ochraceous, margine determinata, abrupta. Sectio 300-750 µm crassa, crystallis perabundans. Hyphae generatoriae fibulatae. Basidia clavata, 4-sterigmata, 50-100 x 9-12 µm. Basidiosporis late ellipsoideis vel lacrimiformis, 13-16 x 8-12 µm, tunica leviter incrassata. Dendrophyses nullae. Hyphidiae perabundantes, crassitunicatae, incrustatae. Ad corticem Nothofagus pumilio et Nothofagus obliqua viventes. Holotypus BAFC 34519.

Fruitbody resupinate, adnate, generally forming small, irregular patches of up to 10 x 7 mm, that may coalesce, forming patches of up to 10-25 x 5-10 mm, 300-750 µm thick. Margin white, blunt, regular, lobate or multilobate, adnate or, sometimes, slightly raised. Hymenial surface white, generally turning light gray, in few cases also light beige, the color developing from the center to the margins, smooth to tuberculate, felty under the lens in the white areas, delicately scrupose in the colored areas. Context white.



Figs. 4-8: *Dendrothele boidinii*, microscopic features. 4. Spores. 5. Basidia. 6. Basidiole. 7. Hyphidia. Bar 10 µm. 8. Section through the hymenium. Bar 25 µm.

Hyphal system monomitic, generative hyphae clamped, 2.5-3.5 µm in diam., with hyaline, thin to thickened walls, obscured by abundant crystals.

Hymenium a catahymenium formed with basidia, basidioles and unbranched hyphidia.

Basidia clavate, 50-100 x 9-12 µm, clamped at base, thin- to thick-walled, guttulate, with four prominent sterigmata up to 15 µm long.

Basidioles claviform, sinuous, 40-100 x 9-13 µm, with hyaline, thin or thickened walls, guttulate.

Dendrophyses absent. **Hyphidia** abundant throughout the fruitbody, thick-walled, strongly encrusted, unbranched, 3-6 µm in diam. The hymenium and context are strongly encrusted with hyaline crystals. When the hymenial surface is colored there is a subhymenial layer consisting of light brown crystals.

Cystidia absent.

Basidiospores subglobose, 13-16 x 8-12 µm, with a distinct apiculus, guttulate, walls smooth, hyaline, slightly thickened, IKI - and cyanophilous.

Habitat: On bark of living or fallen *Nothofagus pumilio* and *Nothofagus obliqua* (Fagaceae).

Etymology: *Dendrothele boidinii* refers to and in honour of Dr. Jacques Boidin (Lyon, France), leading specialist in the biology and morphology of corticioid Aphyllophorales, who has greatly contributed to the knowledge of this genus.

Material studied (host of all specimens is *N. pumilio* except for MR 11197 and 11198b on *N. obliqua*)**:** Argentina, Tierra del Fuego, Estancia El Valdez, leg. AG 28, 29.Nov.95. Tierra del Fuego, Estancia El Valdez, leg. AG 177, 4.Dec.95. Tierra del Fuego, Estancia El Valdez, leg. AG 217 and 218, 4.Mar.96. Tierra del Fuego, Estancia El Valdez, leg. AG 367, 5.Mar.96 (BAFC 34519, Holotype). Estancia El Valdez, leg. AG 368-370, 5.Mar.96. Tierra del Fuego, Estancia El Valdez, leg. AG 401, 5.Mar.96. Tierra del Fuego, Estancia El Valdez, leg. AG 432-434, 5.Mar.96. Chubut, Río Senguer, Lake La Plata, leg. AG and MR 519, 26.Mar.96. Chubut, Languiñeo, Lake Engaño, leg. AG and MR 627, 19.Apr.96. Chubut, Los Alerces National Park, Mt. Dedal, leg. AG 876 and 989, 30.Apr.97. Neuquén, Lanín National Park, Yuko Alto, leg. MR 11197 and 11198, 8.Oct.96.

Remarks: This new species is remarkable on account of the presence of encrusted, unbranched and thick-walled hyphidia instead of dendrophyses. Though this fact deviates from other species included in the genus (Lemke, 1964; Boidin *et al.*, 1996) all other morphological features agree with the generic concept.

Dendrothele incrustans (Lemke) Lemke, Fig. 9
Persoonia 3: 366, 1965.
Basionym: *Aleurocorticium incrustans* Lemke, Can. J. Bot. 42: 739, 1964.

Fruitbody resupinate, adnate, cretaceous, forming small patches 5 x 2 mm, but also larger ones, up to 40 x 10 mm, 70-170 µm thick. Margin irregularly lobate, determinate, abrupt, blunt. Hymenial surface smooth, white or cream colored, rarely rimose, felty or plushy under the lens.
Hyphal system monomitic; generative hyphae with clamps, 2-3(-4) µm in diam., with hyaline walls. The hyphae in the subhymenium and the context are tortuous and thin-walled and those present against the substrate are straight and have thickened walls. The context is covered with abundant, large, rhomboidal crystals up to 15 µm long sides.
Hymenium a catahymenium composed of basidia, basidioles and dendrophyses, obscured by heavy encrustation.
Basidia suburniform or clavate, (30-)45-80(-90) x 10-15 µm, with 4 robust sterigmata up to 15 µm long, with many guttulae in the cytoplasm, clamped at base.
Basidioles ovoid or pyriform when immature, clavate or fusoid when developed, with abundant guttulae, 20-70 x 10-18 µm.
Dendrophyses branched or not, strongly encrusted, thin-walled, the main axis 2-3 µm in diam., the branches 1-2 µm in diam.
Basidiospores subglobose, hyaline, smooth, with slightly thickened walls, (9-) 10-12(-13) x (7.5-)8-9(-10) µm, IKI -, cyanophilous.

Habitat: On bark of standingand fallen *Nothofagus pumilio* and *N. dombeyi*.

Material studied: Argentina Neuquén, Lanín National Park, Lake Lácar, leg. MR, 7.Oct.96 (two specimens on *N. dombeyi*). Chubut, Languiñeo, Lake Guacho, leg. AG 514, 18.Apr.97, (on *N. pumilio*). Río Negro, El Bolsón, Mt. Perito Moreno, leg. AG 855 and 869 (BAFC 34524), 25.Apr.97, (on *N. pumilio*).

Remarks: We have compared our specimens with two collections from Europe (Italy, Badde Salighes, Nuoro, 1000 m, on *Taxus baccata*, leg. & det. A. Bernicchia 3995, 9.Nov.85, Herb. Univers. Bononiensis) and Canada (B.C., Vancouver Island, Gillespie Rd., on *Osmaronia cerasiformis*, leg. H.S. Jackson, 28.Jul.48, det. P.A. Lemke, DAOM 73262). The main differences found were the thickness of the fruitbodies (not thicker than 80 µm in the Northern Hemisphere specimens) and the size of the basidia (not longer than 50 µm in the Northern Hemisphere specimens). Leptocystidia, present in Bernicchia's material, were not found in our specimens. The basidiospores, the texture and other macro and microscopical features were,

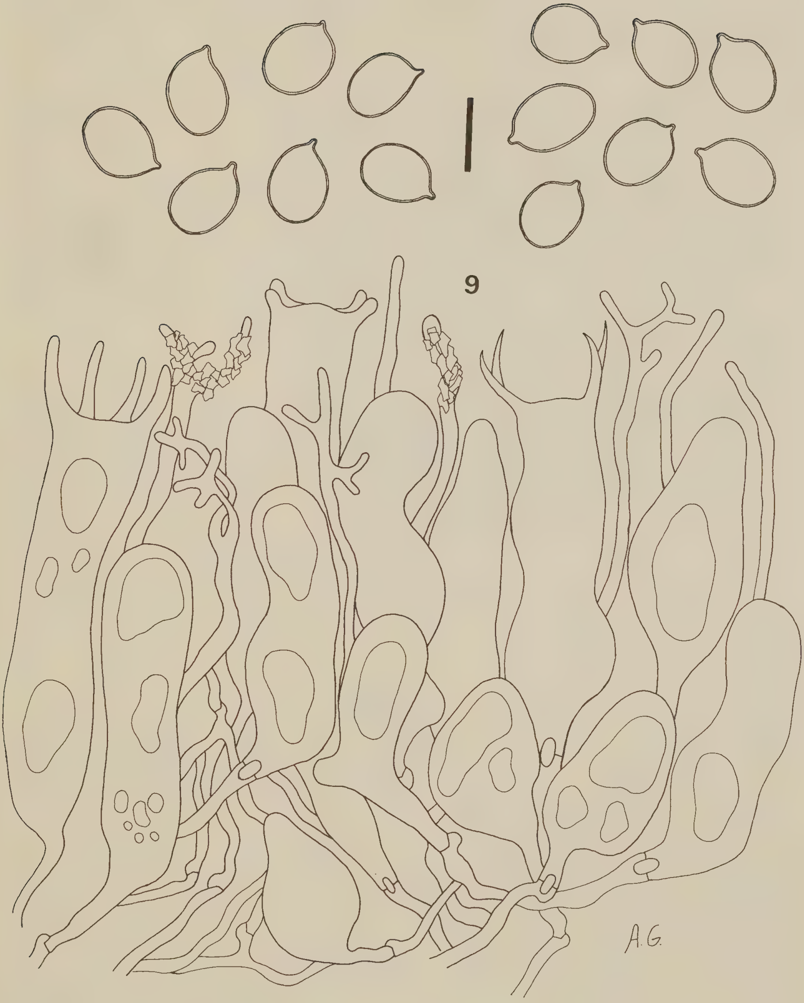


Fig. 9: *Dendrothele incrustans*, section through the hymenium. Bar 10 µm.

however, very similar, supporting the conspecificity of our collections. Most of the Argentinian specimens had thick-walled, spinulose and hyaline hyphae against the substratum. They were scarce and no septa could be found in spite of intensive searching, for which reason they were dismissed as pertaining to the fruitbodies.

Dendrothele lemkei Greslebin & Rajchenb. sp. nov. Figs. 10-14

Jacens, adnata, crustacea, laeve, grandinoidea vel verrucosa, leviter rimosa, cremea vel leviter alutacea. Sectio 50-250 µm crassa, crystallis perabundantibus. Hyphae generatoriae fibulatae. Basidia anguste clavata, 30-70 x 12-15 µm, saepe uncata, 4-sterigmata. Basidiosporae ellipsoideae 12-16 x 8-10 µm, tunica leviter incrassata. Dendrophyses paucae, graciles. Ad truncos emortuos Nothofagi. Holotypus BAFC 34520.

Fruitbody resupinate, adnate, oblong, elongated, 2-40 x 1-8 mm, crustaceous or tightly felty, 50-250 µm thick. Margin thinning out, more or less abrupt, pruinose under the lens. Hymenial surface smooth, irregularly grandinoid or verrucose, slightly rimose, color cream or light yellowish (7.5YR 8/3-8/4, up to 8/6 when drying).

Hymenial system monomitic; generative hyphae with clamps, 2-3 µm in diam., thin-walled, only the ones against the substrate may be slightly thick-walled, much branched and tortuous, with guttulae. Context narrow, obscured by abundant crystals.

Hymenium a catahymenium composed of basidia, basidioles and dendrophyses, obscured by heavy encrustation.

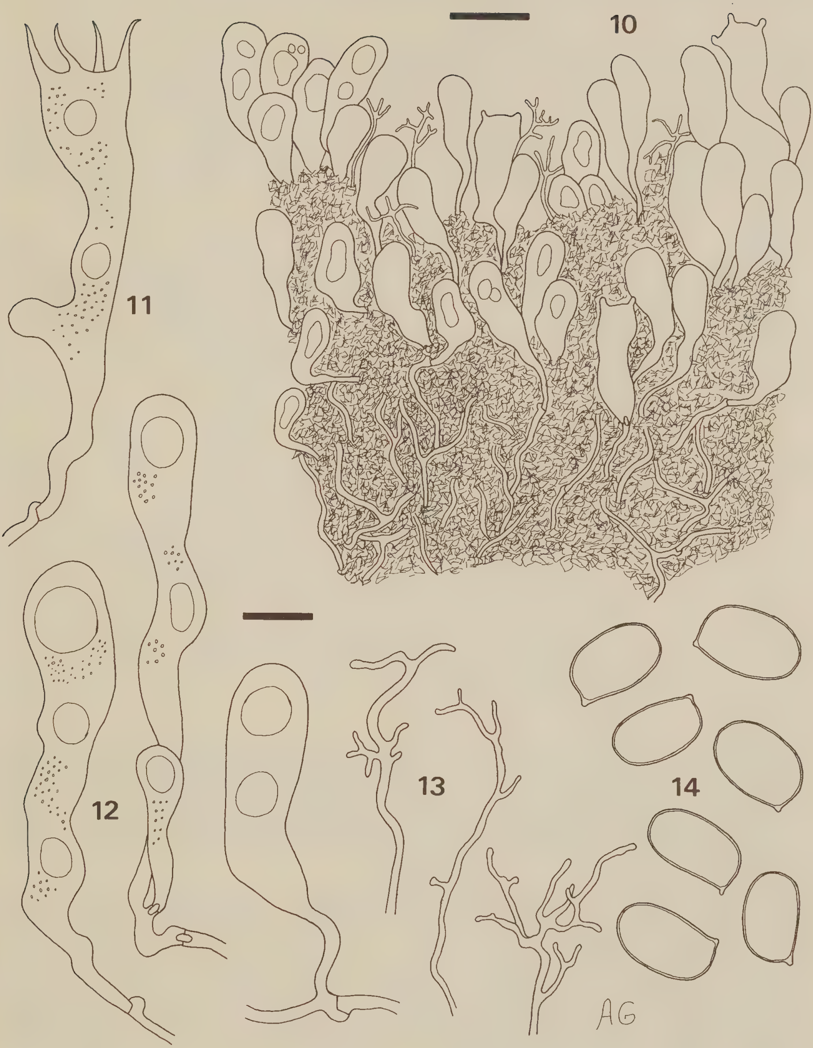
Basidia narrowly clavate, sinuose and frequently with a lateral elongation near the base, with 4 sterigmata and guttulae in the cytoplasm, 30-70 x 12-15 µm, clamped at base. When immature they are widely clavate or subcylindric and, sometimes, with a mid-constriction.

Basidioles widely clavate when young, narrowly clavate and sinuous when developed, 30-80 x 10-15 µm, with thin or thickened walls.

Dendrophyses few, much branched, encrusted, very delicate, 1-2 µm diam. in the base, 1(-1.5) µm diam. in the branches, easy to overlook.

Basidiospores ellipsoid, 12-16 x 8-10 µm, with smooth, slightly thickened walls, IKI -, cyanophilous, with a small apiculus and the cytoplasm filled with guttules.

Habitat: On wood of fallen *Nothofagus pumilio*.



Figs. 10-14: *Dendrothele lemkei*, microscopic features. 10. Section through the fruitbody. Bar 25 µm. 11. Basidia. 12. Basidioles. 13. Dendrophyses. 14. Spores. Bar 10 µm.

Etymology: *Dendrothele lemkei* refers to and in honour of Dr. P.A. Lemke, who monographed the genus *Dendrothele* for North America.

Material studied (host of all specimens is *N. pumilio*)**:** Argentina, Tierra del Fuego, Lake Escondido, leg. AG 131, 2.Dec.95. Tierra del Fuego, River El Valdez, Estancia El Valdez, leg. AG 256, 4.Mar.96 (BAFC 34520, Holotype). Tierra del Fuego, River El Valdez, Estancia El Valdez, leg. AG 282, 5.Mar.96 (BAFC 34521). Tierra del Fuego, Estancia El Valdez, leg. AG and MR 435, 5.Mar.96. Chubut, Languiñeo, Lake Guacho, leg. AG and MR 792, 18.Apr.97.

Remarks: The presence of a catahymenium, dendrophyses, intense encrustation of all the fruitbody and relatively large, slightly thick-walled spores, supports the inclusion of the species in *Dendrothele*. Within the species so far known in this area *D. lemkei* is the only one exclusively found on fallen wood.

Dendrothele pitrae Greslebin & Rajchenb. sp. nov. Fig. 15

Jacens, adnata, crustacea, laevis, alba. Sectio 70-150(-170) μm crassa. Hyphae generatoriae fibulatae. Basidia clavata vel suburniformes 25-50 x 9-12 μm, 4-sterigmata. Basidiosporae cylindricae, leviter vel distincte allantoideae, constricta, (11-)12-15(-16)x 5-5.5(-6) μm, tenuitunicatae. Dendrophyses perabundantes, incrustatae. Ad corticem Myrceugenella exsucca viventes. Holotypus BAFC 34522.

Fruitbody resupinate, adnate, crustaceous, thin, 70-150(-170) μm thick, forming oval, small patches of 5 x 3 mm up to 10 x 8 mm, which may coalesce, forming larger ones of up to 20 x 8 mm. Margin regular or irregularly lobate, determinate, abrupt, adnate. Hymenial surface smooth, white or creamish white (10 YR 8/2-8/3).

Hyphal system monomitic; generative hyphae with clamps, tortuous, 1-3 μm in diam. and thin-walled. Context poorly developed. Crystals are restricted to the dendrophyses.

Hymenium formed with basidia, basidioles and encrusted dendrophyses.

Basidia clavate or suburniform, 25-50 x 9-12 μm, with 4 sterigmata, clamped at the base and with guttulae in the cytoplasm.

Dendrophyses abundant, branched, thin-walled, much encrusted with small, polyhedric crystals that remain attached to the walls after squashing the preparations.

Basidiospores cylindric, slightly or distinctly curved in most cases, with a mid-constriction and tapering towards the distal extreme, (11-)12-15 (-16) x 5-5.5(-6) μm, hyaline, thin-walled, IKI -.

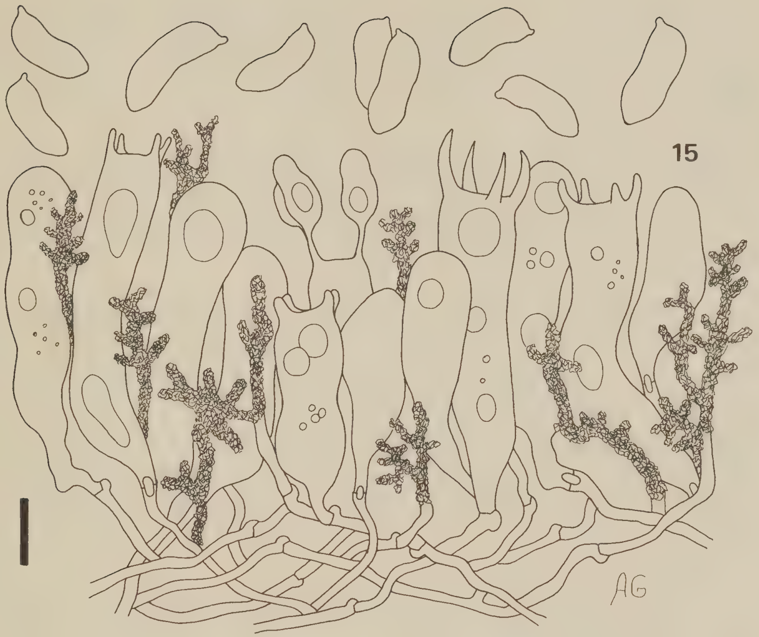


Fig. 15: *Dendrothele pitrae*, section through the fruitbody. Bar 10 µm.

Habitat: On bark of living *Myrceugenella exsucca* (Myrtaceae).

Materials studied (host of all specimens is *M. exsucca*)**:** Argentina, Río Negro, El Bolsón, Loma del Medio, Los Alerces camping area, on the shore of Río Azul , leg. MR 11220, 30.Mar.97. Chubut, Cushamen, small forest at the side of route 258 ca. 9 km from Epuyén, leg. MR and AG 1084 (BAFC 34522, Holotype), 1085, 1086 and 1087, 6.May.97.

Etymology: *Dendrothele pitrae* refers to 'pitra', the common name for the host (*Myrceugenella exsucca*).

Remarks: The species is characterized by its distinctively shaped spores.

Dendrothele tuberculata Greslebin & Rajchenb. sp. nov. Fig. 16

Jacens, adnata, cretacea, tuberculata, alba vel cremea, margine abrupta. Sectio 70-300 µm crassa, crystallis perabundantibus. Hyphae generatoriae *fibulatae. Basidia clavata, 2-sterigmata. Basidiosporae subglobosae vel late ellipsoideae (9-)10-12(-13) x (7-)8-9(-10) µm, crassitunicatae. Dendrophyses paucae. Ad corticem Nothofagi vivente. Holotypus BAFC 34523.*

Fruitbody resupinate, adnate, chalky, forming small, 2 x 2 mm, to medium sized patches up to 22 x 10 mm, 70-300 µm thick. Margin determinate and abrupt in thick basidiomata, thinning out in thinner ones. Hymenial surface strongly tuberculate, smooth in poorly developed specimens, white or whitish cream.

Hyphal system monomitic, with clamped, tortuous, thin-walled generative hyphae, 2-3 µm in diam., obscured by abundant crystals.

Hymenium a catahymenium formed with basidia, basidioles and dendrophyses, obscured by heavy encrustation.

Basidia claviform, with 2 sterigmata, generally terminal, 35-60 x 6-8 µm, but also pleural in few occasions, 15-25 x 7-8 µm, clamped at base.

Dendrophyses few, branched, thin-walled, 1-2 µm in diam., covered with rather large crystals.

Cystidia absent.

Basidiospores subglobose to broadly ellipsoid, (9-)10-12(-13) x (7-)8-9(-10) µm, with smooth, thickened, IKI -, cyanophilous walls and, generally, with a central, large guttule.

Habitat: On bark of living *Nothofagus pumilio*.

Material studied (host of all specimens is *N. pumilio*)**:** Argentina, Estancia El Valdez, leg. AG 327, 4.Mar.96. Chubut, Los Alerces National Park, Mt. Dedal, leg. AG and MR 1059 (BAFC 34523, Holotype) and 1057, 9.May.97.

Etymology: *Dendrothele tuberculata* refers to the tuberculate hymenial surface of the fruitbody.

Remarks: This strictly 2-sterigmate new species seems related to *D. commixta* (v. Höhn. & Litsch.) Erikss. & Ryv. from which it differs by the tuberculate hymenial surface, slightly broader and shorter spores (L/W=1.2-1.3, *cfr*. below), thicker fructification and different host. Two reference specimens (Italy, Bologna, Parco Talon, on *Quercus* sp., 21.Oct.88, leg. & det. A. Bernicchia 4908, Herb. Univers. Bononiensis; Sweden, Halland, Släp por: Särö Västerskog, on *Quercus*, 7.Jun.72, leg. & det. J. Eriksson, DAOM 172405) of *D. commixta* showed a smooth hymenium, ellipsoid to broadly ellipsoid spores (L/W= 1.45, *cfr*. below), basidia with 2-4 sterigmata and a fruitbody thickness not greater than 50 µm.

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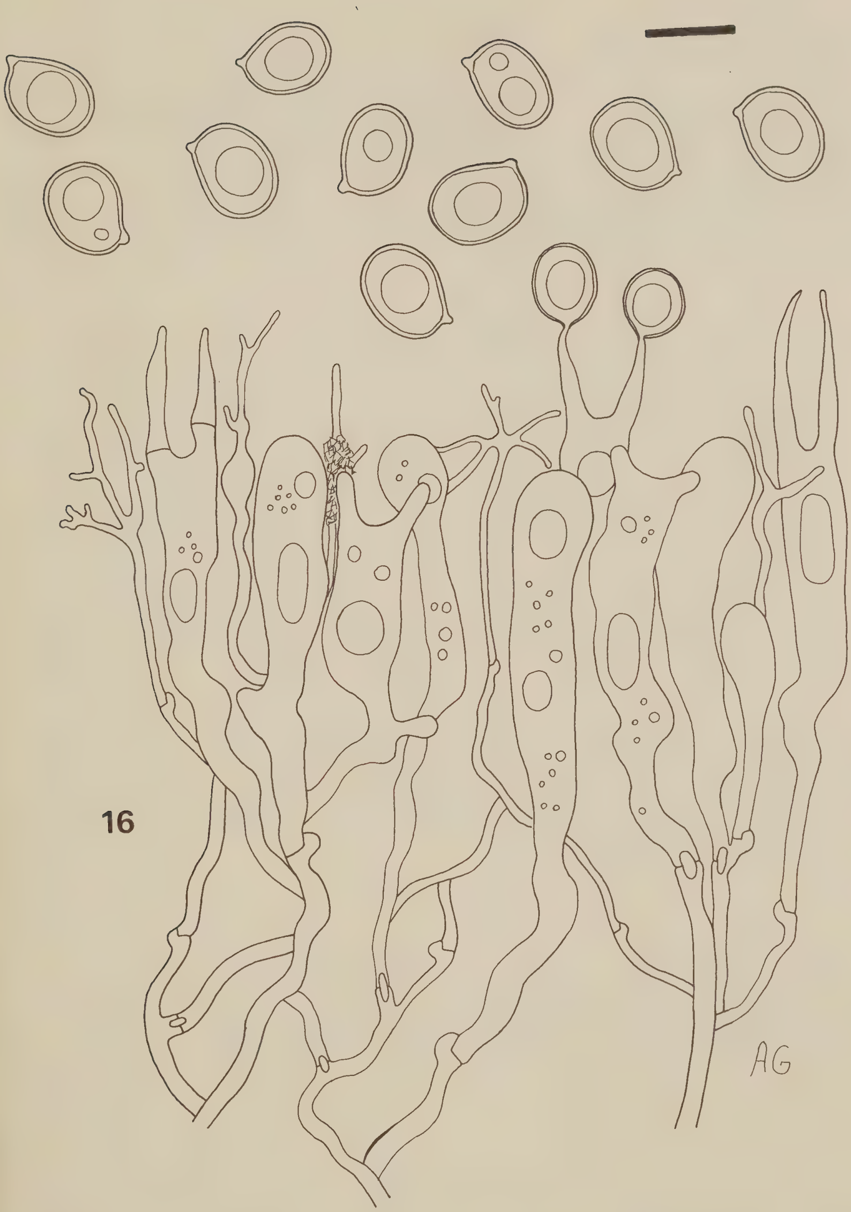

Fig. 16: *Dendrothele tuberculata*, section through the hymenium. Bar 10 µm.

Spores' measurements

Specimen	N	L ± σ (μm)	W ± σ (μm)	L/W
D. tuberculata AG 327	20	10.92 ± 0.71	8.76 ± 0.67	1.24
D. tuberculata AG 1057	20	10.92 ± 0.94	8.31 ± 0.63	1.31
D. tuberculata AG 1059	20	10.42 ± 0.71	8.65 ± 0.65	1.20
D. commixta Bernicchia 4908	22	11.18 ± 0.88	7.70 ± 0.54	1.54

Concluding remarks

Dendrothele seems fairly well represented in the area under study, with several endemic species recorded for the first time. One species, *D. boidinii*, adds a new morphological feature to the genus, *viz.* encrusted, unbranched hyphidia instead of typical encrusted dendrophyses. All the species were remarkable in having large amounts of large crystals, the exception being *D. pitrae*, where crystals were restricted to the dendrophyses. A résumé of the principal features of all the species found are presented in Table 1. As elsewhere, basidia were rarely found in collections of some species (*viz.*, *D. andinopatagonica*). The optimal season for collecting sporulating specimens is the beginning of winter. We suspect that additional taxa might be found in the northern area where few expeditions have been made. A widening of the host range can also be expected; this was the case with *D. andinopatagonica*, an abundant species recorded always on *Maytenus boaria*, with the exception of one specimen found on *Nothofagus obliqua*. A world of treasures can also be expected to be found in the more western locations in this area, where elements of the Valdivian rainforest, like *Myrceugenella exsucca*, occur.

Table 1. Comparison of features of *Dendrothele* species in southern Argentina.

Species	Spores	Sterig. N°	Dendrophyses	Hyphidia	Thickness (µm)	Hymenial surface	Incrustation	Hosts
D. andinopatagonica	ellipsoid 27-32 x 17-22 µm thick-walled	4	+	-	400-850	smooth and rimose white	All fruitbody	*Maytenus boaria* *Nothofagus obliqua* bark of living trees
D. boidinii	widely ellipsoid to lacrimoid 13-16 x 8-12 µm slightly thick-walled	4	-	+	300-750	smooth grey or beige	All fruitbody	*Nothofagus obliqua* *Nothofagus pumilio* bark of living trees
D. incrustans	subglobose 10-12 x 8-9 µm slightly thick-walled	4	+	-	70-170	smooth white	All fruitbody	*Nothofagus dombeyi* *Nothofagus pumilio* bark of living trees
D. lemkei	ellipsoid 12-16 x 8-10 µm slightly thick-walled	4	+	-	50-250	smooth, grandinoid or verrucose light cream to yellowish	All fruitbody	*Nothofagus pumilio* wood of fallen trees
D. pitrae	elongate-ovoid, constricted 12-15 x 5-5.5 µm thin-walled	4	+	-	70-150	smooth white	Restricted to dendrophyses	*Myrceugenella exsucca* bark of living trees
D. tuberculata	subglobose to broadly ellipsoid 10-12 x 8-9 µm thick-walled	2	+	-	70-300	tuberculate white	All fruitbody	*Nothofagus pumilio* bark of living trees

Acknowledgments

Many people contributed to the accomplishment of this work and are warmly acknowledged: Douglas Berwyin, Diego Brand, Martín Caplonch; Directors of Los Alerces, Nahuel Huapi and Lanín National Parks; Dirección General de Recursos Naturales (Río Negro Province), Dirección General de Bosques y Parques (Chubut Province) and Dirección de Recursos Naturales (Tierra del Fuego Province) for allowing us to collect specimens in forests within their properties or under their administration; our colleagues of the Departamento de Silvicultura, Forestry Center CIEFAP (Esquel, Argentina) for organizing several trips to Tierra del Fuego, Drs. J.E. Wright (BAFC), S. Redhead (DAOM), A. Bernnicchia (Herb. Univ. Bononiensis) and K. Hjortstam (Alingsås, Sweden), for providing reference material. Drs. Jacques Boidin (Lyon, France), K. Hjortstam and P. Buchanan (Auckland, New Zealand) acted as pre-submission reviewers and made most valuable suggestions to improve the text.

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ASTERINA KNEMAE - ATTENUATAE SP. NOV. FROM INDIA

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During a survey of phytopathogenic microfungi in Thiruvananthapuram district of Kerala State, the authors came across an endemic plant, *Knema attenuata* (Hook. f. & Thoms.) Warb. (Myristicaceae), infected with a fungus. A critical examination of the pathogen and review of literature revealed that it was an hitherto undescribed species of the genus *Asterina*.

Asterina knemae - attenuatae, sp.nov. (Fig. 1)

Coloniae epiphyllae, densae, crustosae, ad 5 mm diam. Hyphae rectae vel raro anfractuae, irregulariter acuteque vel laxe ramosae, laxe reticulatae, cellulae 25-30 x 4-6 µm. Hyphopodia alternata, circa 1% opposita, remote posita, unicellula, crassa posita et stipitata, mammiformia vel cylindracea, integra vel 1-4 temporibus sublobata, 7.5-20 x 10-12.5 µm. Thyrothecia dispersa vel 1-3 numero connata, orbicularia vel leniter ovata, 150- 250 µm diam., margine crenata, irregulariter patulus ad centro; asci pauci, globosi vel leniter ovati, bitunicati, octospori, 54-58 x 45-50 µm; ascosporae conglobatae, brunneae, bicellulae, leniter constrictae, 25-27 x 11-13 µm, paritus glabrus.

Colonies epiphyllous, dense, crustose, upto 5 mm in diameter. Hyphae straight to rarely crooked, branching irregular at acute to wide angles, loosely reticulate, cells 25-30 x 4-6 µm. Hyphopodia alternate, about 1% opposite, distantly placed, unicellular, broad based to stipitate, mammiform to cylindrical, entire to 1-4 times sublobate, 7.5-20 x 10-12.5 µm. Thyrothecia scattered to 1-3 connate, orbicular to slightly ovate, 150-250 µm in diameter, margin crenate, irregularly opened at the centre; asci very few, globose to slightly ovate, bitunicate, eight spored, 54-58 x 45-50 µm; ascospores conglobate, brown, 2-celled, slightly constricted at the septum, 25- 27 x 11-13 µm, wall glabrus.

Holotype: On leaves of *Knema attenuata* (Hook. f. & Thoms.) Warb. (Myristicaceae), along the river side in the campus of Tropical Botanic Garden and Research Institute, Palode, Thiruvananthapuram, Kerala, India, Feb. 14, 1997, T.S. Nayar HCIO 42462.

Asterina coelocaryi Hansf., *A.horsfieldiae* Hansf. and *A. pycnanthi* Hansf. are known on the members of the family Myristicaceae. Based on the the morphology of the hyphopodia and epiphyllous colonies, the present species can be compared with *Asterina horsfieldiae* Hansf. However, the new species differs from it in having only 1% opposite hyphopodia, only crenate margins of the thyrothecia and smaller and smooth-walled ascospores (Hansford, 1954). Further, the present host is endemic to the Western Ghats of the Peninsular India while, *Horsfieldia* is not represented in India (Santapau & Henry, 1984; Nayar, 1997).

Acknowledgements

We are thankful to the Forest Department, Govt. of Kerala for the financial assistance and to Dr. P. Pushpangadan, Director, TBGRI for encouragement. We are grateful to Prof. R.D. Goos and Dr. J.L. Crane for their pre-submission review of the manuscript.

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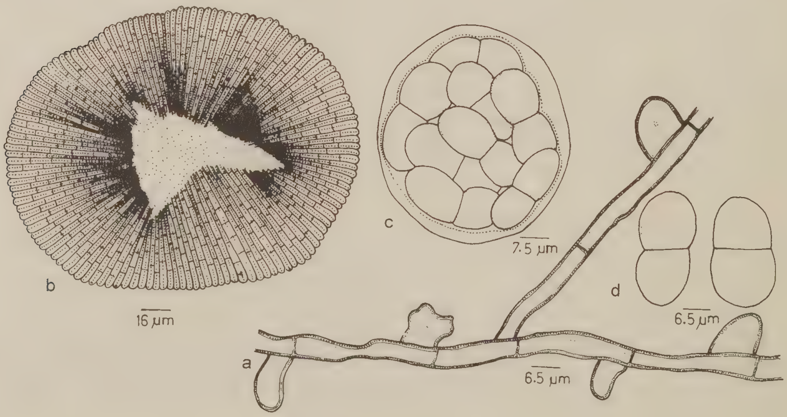

Fig. I ***Asterina knemae-attenuatae*** **sp. nov.**
a - Hyphopodiate mycelium, b - Thyrothecium
c - Ascus, d - Ascospores

MYCOTAXON

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A NEW SPECIES OF PHAEORAMULARIA (HYPHOMYCETES) CAUSING LEAF SPOTS ON DICHONDRA SP. (CONVOLVULACEAE)

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ABSTRACT

A new species of *Phaeoramularia* Muntañola is described as *P. destruens*. It has been experimentally proven to be the causal agent of a leaf spot disease of *Dichondra* sp. (Convolvulaceae), eventually causing leaf drop and death of plants.

RESUMEN

Se describe una nueva especie de *Phaeoramularia* Muntañola, bajo el nombre *P. destruens*. Se ha comprobado experimentalmente que es el agente causal de una mancha foliar de *Dichondra* sp. *(Convolvulaceae)*, que eventualmente puede causar defoliación y muerte de plantas.

Dichondra spp. (Convolvulaceae) are herbaceous broad-leaved species cultivated as components of lawns in Argentina and elsewhere. There is an increasing concern about the diseases affecting them, especially those causing leaf spots (Gambogi, Vannacci & Triolo, 1975; Laundon, 1979; Farr *et al.*, 1989; Crous & Braun, 1995; Frisullo & Braun, 1996). In Argentina, so far, three leaf spot diseases have been identified, caused by *Alternaria dichondrae* Gambogi, Vannacci & Triolo (Wolcan & Perelló, 1985-86), *Cercospora gossypina* Cooke, and a third dematiaceous hyphomycete which had been tentatively identified as *Mycovellosiella dichondrae* (Anderson & Delhey, 1996). However, more detailed studies indicated that the latter species would be more appropriately accomodated within *Phaeoramularia* as a new species of this genus.

In the present study we report on the occurrence of this new disease, attributed to *Phaeoramularia destruens,* which we describe and propose as a new species.

MATERIALS AND METHODS

Isolation: The fungus was isolated from diseased leaves of *Dichondra* sp. on Potato Dextrose Agar (PDA), prepared according to Dhingra & Sinclair (1985).

Artificial inoculations: Inoculum was prepared by washing off spores from naturally infected leaves. Healthy plants of *Dichondra* sp. were sprayed with a suspension of spores in distilled water. Inoculated and test plants were kept in a humid chamber for 15 days. Reisolations were carried out on PDA from inoculated leaves showing early disease symptoms.

Fungal structures were mounted in tap water for microscopical observations, photographs and measurements.

RESULTS

Phaeoramularia destruens F. Anderson, Delhey & U. Braun, *sp. nov.*

Etymology: from Latin *destruo* (to destroy), in reference to the destructive quality of the fungus on *Dichondra* plants.

Maculae amphigenae, brunneae, 1-8 mm diam., saepe zonatae, margine indistincto, vel margine tenui et leniter elevato cinctae. Caespituli amphigeni, punctiformes, brunnei. Mycelium immersum. Stromata substomatalia, 20-50 µm diam., brunnea. Conidiophora laxe fasciculata, (5-)10-27, stromate quoque oriunda, per stoma emergentia, erecta, subcylindrica vel leniter geniculata-sinuosa, simplicia, interdum ramosa, 24-85 x 3-5 µm, septata, pallide brunnea, levia. Cellulae conidiogenae integratae, terminales, polyblasticae, sympodiales. Cicatrices conidiales conspicuae, incrassatae, fuscae. Conidia solitaria, vel catenata, saepe ramicatenata, acropleurogena, saepe subcylindrica-fusiformia, 24-117 x 3-5 µm, 0-4(-8) septata, subhyalina, pallidissime olivacea, levia, utrimque rotundata vel subtruncata, hila leniter incrassata, fusca.

Holotypus: on *Dichondra* sp., Argentina, Buenos Aires, Villarino, Mayor Buratovich, Nov. 1993, *leg.* Anderson & Azpilicueta [Delhey 1197 (BBB)]. Isotypus: HAL.

Leaf spots amphigenous, brown, 1-8 mm diam., often zonate, margin indefinite or with a narrow, often somewhat raised marginal line. Caespituli amphigenous, punctiform, brown. Mycelium internal. Stromata substomatal, 20-50 µm diam., brown. Conidiophores (Figs. 1, 7) loosely fasciculate, (5-)10-27 per fascicle, arising from stromata, emerging through stomata, erect, straight, subcylindric to slightly geniculate-sinuous, simple, occasionally branched, 24-85 x 3-5 µm, septate, pale brown throughout, smooth; conidiogenous cells integrated, terminal, polyblastic, sympodial; conidial scars conspicuous, somewhat thickened, darkened. Ramoconidia abundant (Fig. 2). Conidia (Figs. 3, 4) solitary or catenate, often in branched chains, acropleurogenous, usually subcylindric-fusiform, 24-117 x 3-5 µm, 0-4(-8) septate, subhyaline, very pale olivaceous, smooth, ends rounded to subtruncate, hila somewhat thickened and darkened.

Colonies on PDA velvety, slow-growing, dark green to greyish green. Mycelium with many swollen, thick-walled cells (Figs. 5, 6), generally in intercalary chains.

Type: On leaves of *Dichondra* sp., collected in Mayor Buratovich, Villarino, Buenos Aires, Argentina, November 1993, *leg.* Anderson & Azpilicueta [Delhey 1197 (BBB)]. Isotype: HAL.

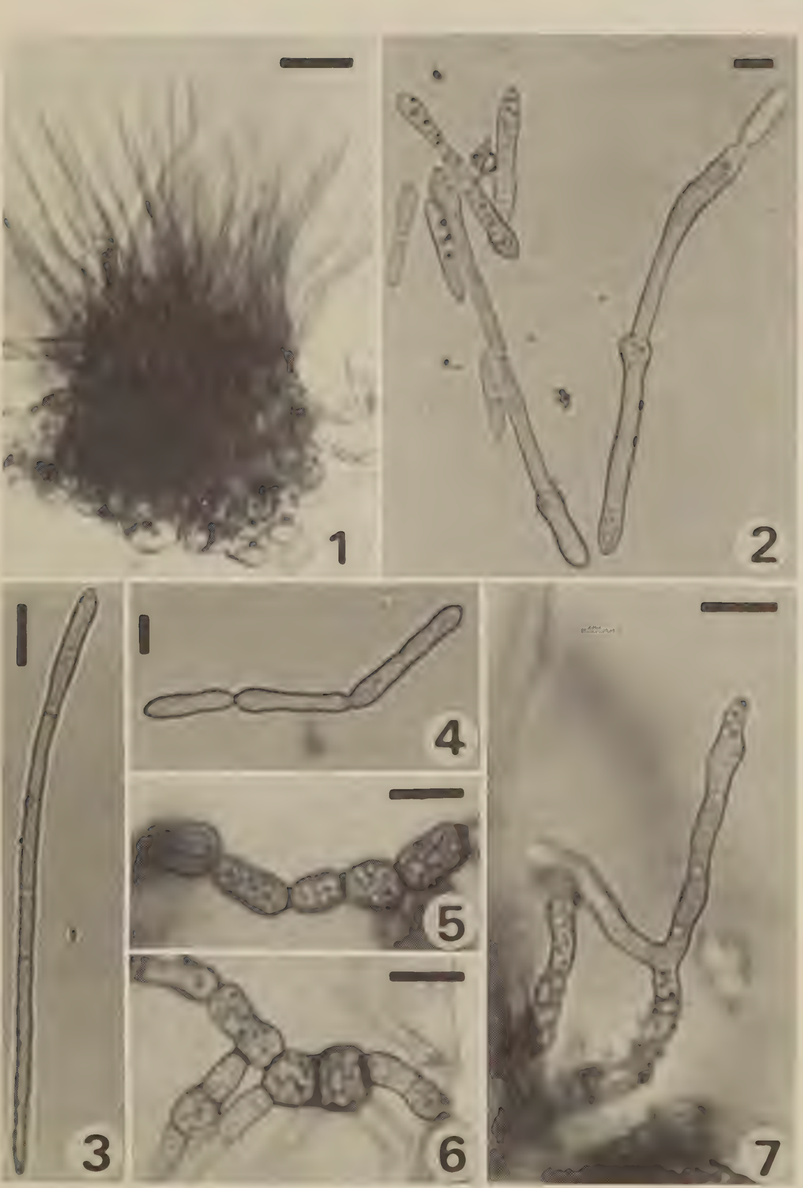
Teleomorph: unknown.
Distribution: South of Buenos Aires Province, Argentina.

Artificial inoculations: First symptoms appeared two weeks after inoculation, leading to necrosis and leaf fall within one month after inoculation. *P. destruens* was succesfully isolated from the margins of leaf spots on inoculated leaves, thus confirming Koch's postulates.

DISCUSSION

Phaeoramularia destruens belongs to the cercosporoid hyphomycetes. There are two other members of this group known to infect *Dichondra* spp. *Cercospora dichondrae* Katsuki, described in Japan in 1965 and recently reduced to synonymy with *C. ipomoeae* G. Winter (Frisullo & Braun, 1996) seems to be identical with *C. gossypina* Cooke reported on *Dichondra* sp. in Argentina (Anderson & Delhey, 1996). There is increasing evidence that both *C. ipomoeae* and *C. gossypina* (and others), should be synonymized with *Cercospora apii* Fresen. (Ellis, 1971; Pons & Sutton, 1988; Anderson & Delhey, in press; Anderson, unpublished). In any case, whatever the outcome of this taxonomical problem might be, the *Cercospora* on *Dichondra* bears solitary, acicular and hyaline conidia, thus being quite distinct from *Phaeoramularia destruens*.

Figs.1-7. *Phaeoramularia destruens*. Fig. 1: Conidiophores arising from stroma. Fig. 2: Ramoconidia and conidia. Figs. 3, 4: Conidia. Fig. 5, 6: Swollen thick-walled cells of mycelium on PDA. Fig. 7: Conidiophore on PDA. Scale bars=10µm.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Mycovellosiella dichondrae Crous & U. Braun (1995), so far known only from South Africa, differs from *P. destruens* in having a well-developed secondary mycelium and conidia which frequently form short lateral branches. Furthermore, *Phaeoramularia platensis* (Speg.) Deighton (in Ellis, 1976: 319) on *Calonyction* (Convolvulaceae) from Argentina, possesses wider conidiophores, 5-8 µm, and pale brown, mostly verruculose conidia, often somewhat constricted at the septa.

Phaeoramularia destruens owes its name to the striking effects it produces on infected plants of *Dichondra* spp., which can include leaf drop and even death of plants.

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ON USTILAGO SPARTI (USTILAGINALES, BASIDIOMYCOTINA)

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ABSTRACT: The taxonomic and bibliographic information, as well as the distribution of *Ustilago sparti* Massenot, a parasitic smut on *Lygeum spartum* L., is synthesized. Many samples including the type have been studied, with the aim of characterizing this species.

Keywords: *Ustilago sparti*, Ustilaginales, Mediterranean area.

RESUMEN: Se sintetiza la información taxonómica, corológica y bibliográfica de *Ustilago sparti* Massenot, Ustilaginal parásito de *Lygeum spartum* L. Se han estudiado numerosos ejemplares, incluído el tipo, con el fin de caracterizar esta especie, cuya delimitación había sido confusa hasta ahora.

Palabras clave: *Ustilago sparti*, Ustilaginales, región Mediterránea.

INTRODUCTION

The first published reference on this smut fungus is by Rabenhorst (1874) who reported, without any description, *Ustilago hypodytes* var. *lygei* Rabenh. from Castelserás (Spain), collected by Loscos. On the other hand, distributed in exsiccata is "*Ustilago lygei* Rabenh. Mspt. Cagliari nel R. orto botanico, in *Lygeo sparto*, Marzo. Un. itin. crypt. 1866. Dr. Marcucci". No description was given associated to this exsiccatum.

Saccardo (1888) considered *U. lygei* as a synonym of *U. hypodytes*.

Maire (1906) combined both *U. hypodytes* and *U. lygei* under the genus *Cintractia*: *C. lygei* (Rabenh.) Maire and *C. hypodytes* (Schltdl.) Maire.

Ciferri (1938) subordinated all the names to *Ustilago lygei* Rabenh. Guyot et al. (1955) described *Ustilago sparti* Massenot on *Lygeum spartum* from Tunisia. They separated it from *U. lygei* based on the kind of deformation produced on the host plant: *U. lygei* completely destroys the inflorescence and the floral parts cannot be recognized, while *U. sparti* does not produce this total destruction of the inflorescence and some floral parts can be recognized. However, in the same paper they note that in *Ustilago lygei* all the intermediate forms of destruction can exist.

MATERIAL AND METHODS

Field samples and samples from the herbarium of the Real Jardín Botánico of Madrid (MA-Funhist and MA-Fungi collections), have been studied, and *Lygeum spartum* sheets from the MA vascular plant collection have been checked. The type of *Ustilago sparti* Massenot kept at PC, as well as collections from MPU and K, have been checked too.

RESULTS

The taxonomic treatment of the species is below. The description and measurements are based on the material studied, including type material.

Ustilago sparti Massenot, in Guyot et al., Rev. Pathol. Vég. Entomol. Agric. France 34(4): 216. 1955.
=*Ustilago lygei* Rabenh. Un. itin. crypt. 1866, IV. In sched., nom. nud.
=*Ustilago hypodytes* var. *lygei* Rabenh., Hedwigia 13(4): 59. 1874. nom. nud. ≡*Cintractia lygei* (Rabenh.) Maire, Bull. Soc. Bot. France 53: CXCVIII. 1906.
Typus: In PC! On *Lygeum spartum*. Tunisia, Hadjeb-el-Aioun, 1-X-1953, L. Guyot [lectotypus, VÁNKY, 1994: 376]. Près Kasserine, 2 octobre 1953, L. Guyot [syntypus, GUYOT et al., 1955:215].
Icon.: Maire (1906: fig. XXXIX); Guyot, Malençon & Massenot (1955: fig. V); Vánky (1994: fig. 449). **Fig. 1-2.**

Sori in the inflorescences, hidden by the inflorescence sheath, powdery, dark greyish brown (62.d.gy.Br, ISCC-NBS Centroid Color Charts). The inflorescences abort and the floral parts may or may not remain recognizable. Spores single or in chains, globose, ellipsoid or ovoid, occasionally irregular in shape, 3.5-7 x 4-7 (9) µm; spore wall smooth under the light microscope; densely verruculose under the scanning electron microscope; the warts are more or less agglomerate and can anastomose; polar caps can sometimes be distinguished at the poles of the spores.

Habitat and distribution: On *Lygeum spartum* L. (*Poaceae*). Known from the western Mediterranean (Fig. 3).
The following information on the species is given below: Province (for Spanish localities), locality, UTM grid-coordinates (for Spanish localities), altitude, host species, collecting date, personal collection number and herbarium number. For bibliographic reports, the author and year of publication, and the name with which it was published (if different from the accepted name) are indicated. Material from localities followed by "!" have been checked. Information in brackets does not appear in the publication but does so in the corresponding label sheets. An asterisk preceding the name of the province means a first record.

ALGERIA:

Le Kreider, in inflorescences of *Lygeum spartum*, 18-IV-1906, [MPU, Hg-1922]!. Oran, à La Senia, in inflorescence of *Lygeum spartum*, 11-IV-1906, [MPU, Hg-1922]!. (MAIRE, R., 1906: CXCVIII, as *Cintractia lygei* (Rabenh.) Maire).

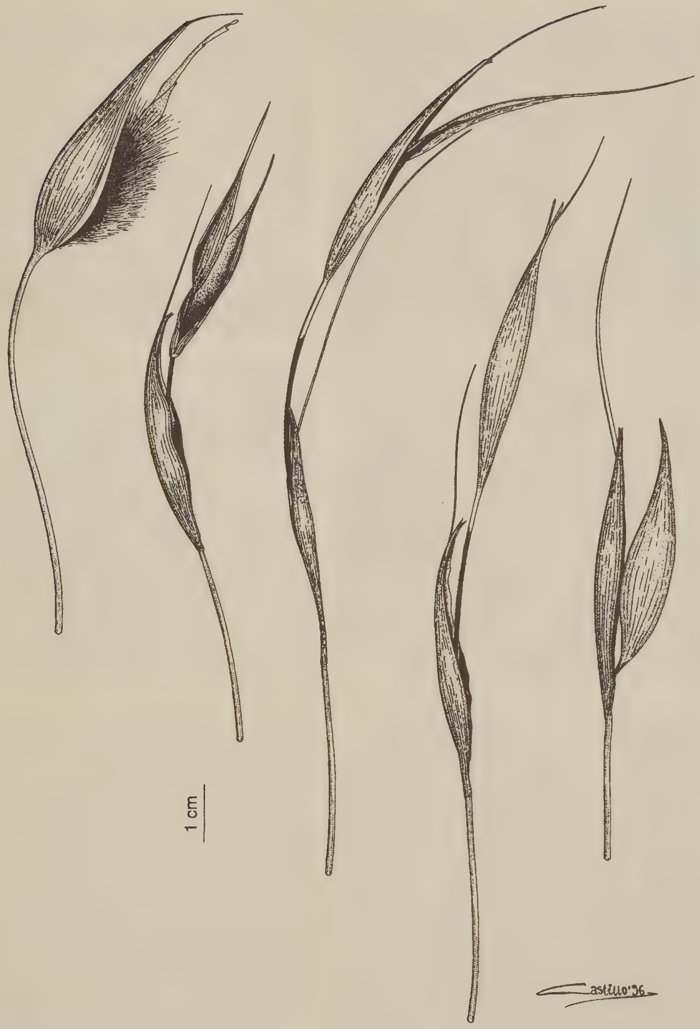

Fig. 1: Sori of *Ustilago sparti* Massenot on *Lygeum spartum* L. a: Jávea, MA 440474, healthy inflorescence of *Lygeum spartum*,. b, c, d: Villafranca de Ebro, MA-Fungi 36119, infected inflorescences. e: Hadjeb-el-Aioun, PC (herb. Massenot, typus), infected inflorescences.

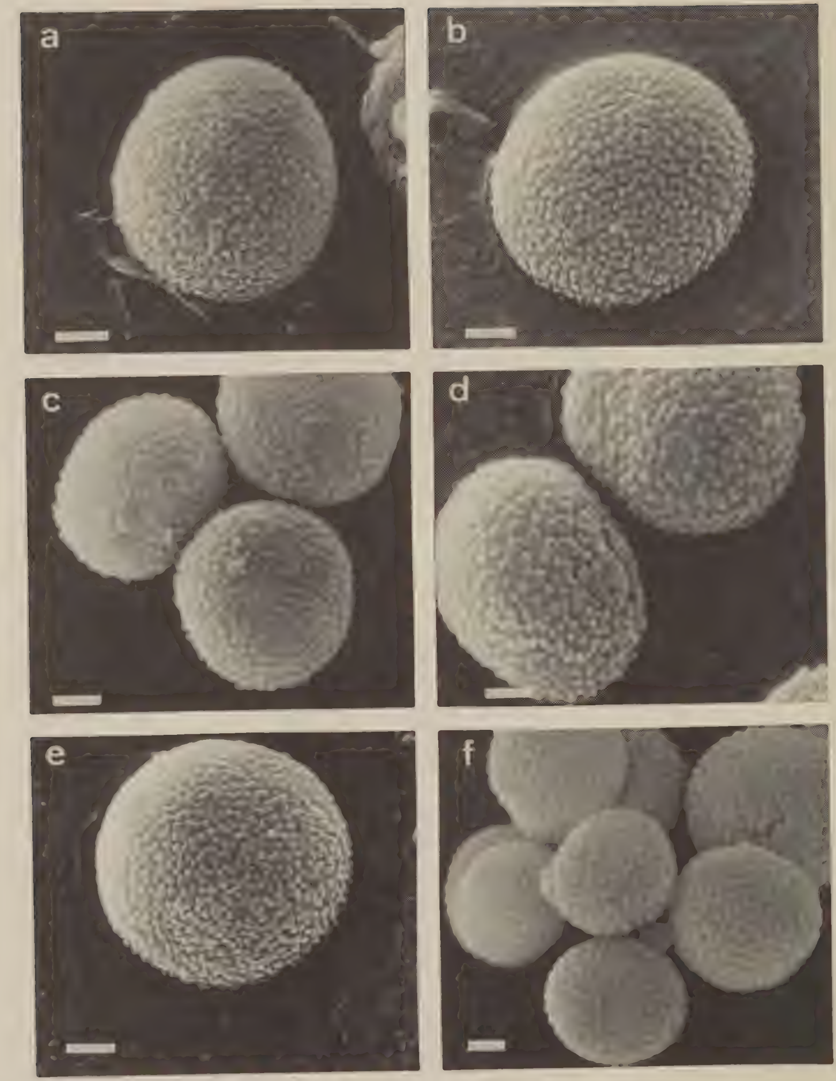

Fig. 2: Spores of *Ustilago sparti* Massenot from different samples, under SEM. a, b: Hadjeb-el-Aioun, PC (herb. Massenot, typus). c: Le Kreider, MPU (Hg-1922). d: Cagliari, K(M) 39300. e: Barcelona, MA-Funhist 16919. f: Ubeda, MA-Funhist 16918.

Tircount, close to Oran, in *Lygeum spartum*, 9-IV-1914. (TROTTER, A., 1916: 38, as *Ustilago lygei* Rabenh.).

Dép. de Saîda, Bougtob, in inflorescences of *Lygeum spartum*, 17-IV-1975, leg. G.Durrieu, MA-Fungi 32980!.

ITALY:

Cagliari, nel R. Orto Botanico, in inflorescences of *Lygeum spartum*, III-1866, [K(M): 39300]!. (as *Ustilago lygei* Rabenh.).

Sicilia, Licata, in *Lygeum spartum*, 1877, K. Sicilia, prov. Agrigento, inter pagg. Cantanello et S. Leone, 10 m alt., in *Lygeum spartum*, 2-V-1978, K (I. & H. Hertel 19195).

LYBIA:

M. Mergheb, presso Homs, in *Lygeum spartum*, III. (TROTTER, A., 1912: 511, as *Cintractia lygei* (Rabenh.) Maire).

Csar Garian, in inflorescences of *Lygeum spartum*, 17-V-1913. Between Uadi Majal and Uadi Caam, Sliten, in inflorescences of *Lygeum spartum*, 27-IV-1913. (SACCARDO, P.A. & TROTTER, A., 1913: 415, as *Ustilago lygei* Rabenh.).

Garian, Assaba, in *Lygeum spartum*, 28-IV-1913. Tarhuna, Uadi Msaaba, in *Lygeum spartum*, 18-III-1913. (SACCARDO, P.A., 1913: 5, as *Cintractia lygei* (Rabenh.) Maire).

Nefusa, dintorni di Nalut, in *Lygeum spartum*, 9-IV-1914. (TROTTER, A. 1916: 38, as *Ustilago lygei* Rabenh.).

Bengasi, in *Lygeum spartum*, 1922. (PAMPANINI, R., 1930: 47, as *Ustilago lygei* Rabenh.).

MOROCCO:

Sidi Hof, close to Caïd Tounsi (Doukkala), in *Lygeum spartum*, IV, VII-1921. (JAHANDIEZ, E., 1923: 122, as *Cintractia lygei* (Rabenh.) Maire).

Goulimime, in *Lygeum spartum*, 9-VI-1934. (YEN, W.Y., 1937: 76, as *Ustilago hypodytes* (Schltdl.) Fr.).

Berguent, in *Lygeum spartum*, 24-V-1955. Ksar es Souk, in *Lygeum spartum*, III-1941, herb. G. Malençon (Champignons du Maroc n° 2472). (GUYOT, L., MALENÇON, G. & MASSENOT, M., 1955: 209, as *Ustilago lygei* Rabenh.).

SPAIN:

ALICANTE: Novelda, in inflorescences of *Lygeum spartum*, V-1934, [MA-Funhist 16917]!. (UNAMUNO, L.M., 1934: 253; UNAMUNO, L.M., 1941: 34; GUYOT, L., MALENÇON, G. & MASSENOT, M., 1955: 211, as *Cintractia lygei* (Rabenh.) Maire).

Busot, in inflorescences of *Lygeum spartum*, 23-V-1933. Portichol, in inflorescences of *Lygeum spartum*, 5-V-1933, [MA-Funhist 16915]!. (UNAMUNO, L.M., 1935: 160, as *Cintractia lygei* (Rabenh.) Maire).

ALBACETE: Caudete, [inflorescences of *Lygeum spartum*], IV-1928, [MA-Funhist 16916]!. (UNAMUNO, L.M., 1930: 381; GUYOT, L., MALENÇON, G. & MASSENOT, M., 1955: 211, as *Cintractia lygei* (Rabenh.) Maire).

*ALMERIA: Aguadulce, road to Enix, southern slope of Sierra de Gádor, 30SWF37, 180 m alt., in inflorescences of *Lygeum spartum*, 5-V-1975, Mercé3401, MA-Fungi 14940!. Almería, road from Almería to Cabo de Gata, 30SWF6377, 20 m alt., in inflorescences of *Lygeum spartum*, 4-VI-1975, Mercé3396, MA-Fungi 14936!. Almería, road from Almería to Cabo de Gata, 30SWF7065, 5 m alt., in inflorescences of *Lygeum spartum*, 13-VI-1971, Mercé2337, MA-Fungi 14945!. Garrucha, 15 km north of Garrucha, 30SXG12, 50 m alt., in inflorescences of *Lygeum spartum*, 6-V-1975, Mercé3436, MA-Fungi 14793!. Tabernas, road from Almería to Tabernas, 20 km from Almería, 30SWF4996, 150 m alt., in inflorescences of *Lygeum spartum*, 9-X-1970, Mercé2149, MA-Fungi 14786!. ibídem, 14-VI-1971, Mercé2358, MA-Fungi 14974!. Zurgena, road from Huércal-Overa to Baza, 30SWG8435, 230 m alt., in inflorescences of *Lygeum spartum*, 7-VI-1975, Mercé3442, MA-Fungi 14943!. Níjar, Sierra del Cabo de Gata, ravine El Cigarrón, 30SWF7470, 150 m alt., inflorescences of *Lygeum spartum,* with *Chamaerops humilis* on volcanic substrate, 24-IV-1995, TAL162, MA-Fungi 36114!.

*BARCELONA: Barcelona municipality, in inflorescences of *Lygeum spartum*, VIII-1925, MA-Funhist 16919!.

HUESCA: Fraga, [inflorescences of *Lygeum spartum*], [19-V-1965], [MA-Fungi 32882]!. (DURRIEU, G., 1966: 182, as *Ustilago lygei* Rabenh.).

JAEN: Ubeda, close to the river Guadalquivir, [inflorescences of *Lygeum spartum*], 27-VII-1925, [MA-Funhist 16918]!. (GONZÁLEZ FRAGOSO, R., 1926: 57, as *Cintractia lygei* (Rabenh.) Maire).

La Guardia de Jaen, road from Jaen to Granada, 30SVG47, 550 m alt., in inflorescences of *Lygeum spartum*, 17-VII-1971, Mercé2420, MA-Fungi 14906!. ídem, 11-IX-1971, Mercé2651, MA-Fungi 14920!.

Campillo de Arenas, on *Lygeum spartum*, 24-IV-1957. (GUYOT, L., MALENÇON, G. & MASSENOT, M., 1958: 196, as *Ustilago lygei* Rabenh.).

LERIDA: From Llano de Urgel to Miralcamp, in inflorescences of *Lygeum spartum*, 31-VIII-1911, MA-Fungi 36115 [ex MA 4495 (2)]!.

Between Lérida and Bell Lloch, [inflorescences of *Lygeum spartum*], [18-V-1965], [MA-Fungi 32883]!. (DURRIEU, G., 1966: 182, as *Ustilago lygei* Rabenh.).

Cubells, La Noguera, CG34, on *Lygeum spartum*, 12-V-1983, ILL 145, BCC Mycotheca. (LLORENS, I., 1985: 41, as *Ustilago lygei* Rabenh.).

*MADRID: Aranjuez, in inflorescences of *Lygeum spartum*, IV, MA-Funhist 16914 !. Alcalá de Henares, ravine La Zarza, 30TVK7079, in inflorescences of *Lygeum spartum*, 6-VII-1996, TAL374, MA-Fungi 36116!.

MURCIA: Bullas, in inflorescences of *Lygeum spartum*, 8-III-1896, MA-Fungi 36117 [ex MA 4487(2)]!.

Cartagena, close to Los Martínez, XG68, in inflorescences of *Lygeum spartum*, 9-V-1982, JNR9099, MUB. Puerto Lumbreras, XG05, in inflorescences of *Lygeum spartum*, 3-III-1984, JNR9090, MUB. Rambla del Tinajón, XH5125, in inflorescences of *Lygeum spartum*, 24-IV-1985, JNR9120, MUB. Sierra de Columbares, XG79, in inflorescences of *Lygeum spartum*, 2-IV-1985, JNR9117, MUB. (NAVARRO, J., HONRUBIA, M. & TORRES, P., 1987: 70, as *Ustilago lygei* Rabenh.).

NAVARRA: Caparroso. (COLMEIRO, M., 1889: 707, as *Ustilago lygei* Rabenh.).

TERUEL: Castelserás, K(M): 39489!. (RABENHORST, L., 1874: 59, as *Ustilago hypodytes* var. *lygei* Rabenh.; LOSCOS, F., 1886: 43, as *Ustilago lygei* Rabenh.).

Castelserás, road to Torrevelilla, 30TYL4040, 400 m alt., in inflorescences of *Lygeum spartum*, 24-VIII-1996, TAL395, MA-Fungi 36118!.

*TOLEDO: Miguel Esteban, La Laguna, 30SVJ8876, 660 m alt., in inflorescences of *Lygeum spartum*, 19-V-1997, TAL410, MA-Fungi 36770!

ZARAGOZA: Zaragoza municipality, in inflorescences of *Lygeum spartum*, VI-1943, MA-Funhist 16913!.

Close to Zaragoza, road to Madrid, in *Lygeum spartum*, 28-VIII-1955. (GUYOT, L., MALENÇON, G. & MASSENOT, M., 1958: 195, as *Ustilago lygei* Rabenh.).

La Almolda de Monegros, in *Lygeum spartum*, 9-IV-1963, [MA-Fungi 32881]!. (DURRIEU, G., 1964: 159, as *Ustilago lygei* Rabenh.).

Bujaraloz, Laguna de La Playa, [inflorescences of *Lygeum spartum*], [4-V-1964], [MA-Fungi 32880]!. La Almolda, [inflorescences of *Lygeum spartum*], [9-IV-1963], [MA-Fungi 32881]!. (DURRIEU, G., 1966: 182, as *Ustilago lygei* Rabenh.).

Osera, in *Lygeum spartum*, 10-XI-1973. (MALENÇON, G. & BERTAULT, R., 1976: 22, as *Ustilago lygei* Rabenh.).

Monegros, in *Lygeum spartum*, 22-IV-1982, ILL 16, BCC Mycotheca. (LLORENS, I., 1985: 41, as *Ustilago lygei* Rabenh.).

Villafranca de Ebro, road from Osera to Monegrillo, km 10, 30TYM0708, 300 m alt., in inflorescences of *Lygeum spartum*, on gypsum soil, 27-VI-1996, TAL343, MA-Fungi 36119!.

TUNISIA:

Kroussiah, between Sbeitla and Kasserin, in *Lygeum spartum*. (PATOUILLARD, N., 1892: 8, as *Ustilago hypodytes* (Schltdl.) Fr.).

Sidi-el Hani, in *Lygeum spartum*, II, III-1897. (PATOUILLARD, N., 1897: 207, as *Ustilago hypodytes* (Schltdl.) Fr.).

Hadjeb-el-Aioun, in inflorescences of *Lygeum spartum*, on steppe, 1-X-1953, [PC, (herb. Massenot), holotypus]!. Kasserine, in inflorescences of *Lygeum spartum*, on steppe, 1-X-1953, [PC, (herb. Massenot), syntypus]. Sainte Monique, close to Túnez, in *Lygeum spartum*, 1954 (as *Ustilago lygei* Rabenh.). (GUYOT, L., MALENÇON, G. & MASSENOT, M., 1955: 209-215).

Matmata, south of Gabès (MAIRE, R., 1909, fide GUYOT et al., 1955). Sousse (BUROLLET, 1927, fide GUYOT et al., 1955).

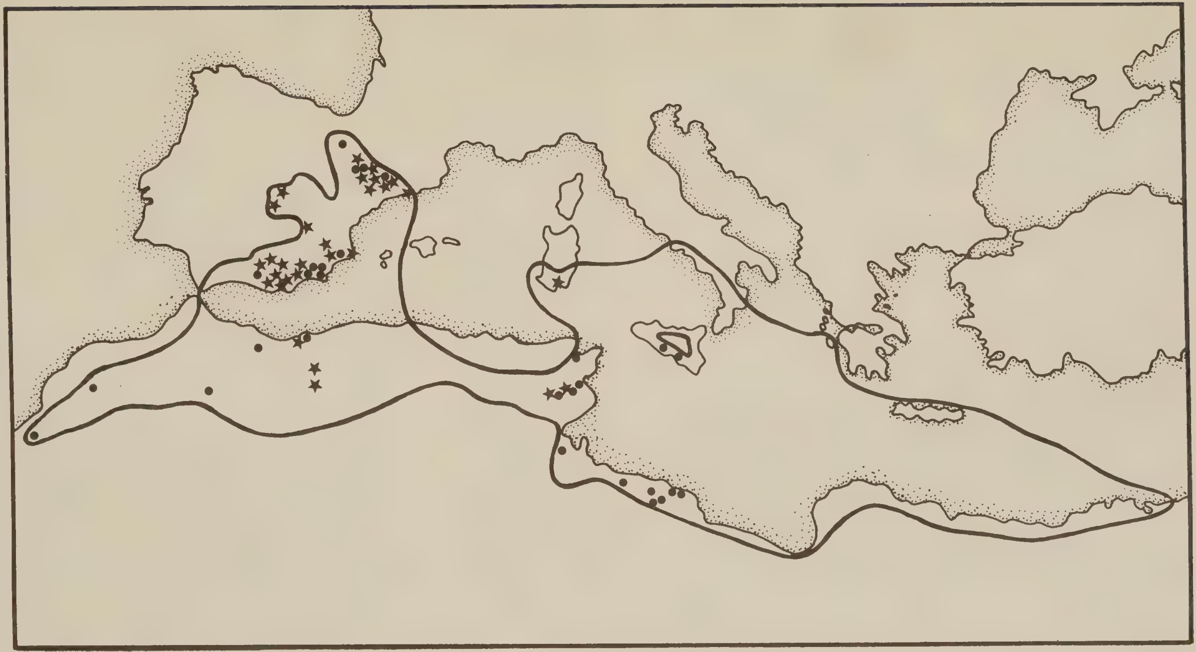

Fig. 3: Geographic distribution. The thick line represents the distribution area of *Lygeum spartum* L., according to Font Quer (1927), Meusel & Kästner (1990) and Rikli (1943-46): The stars and dots represent the reports on *Ustilago sparti* Massenot: Stars (★): material checked. Dots (●): bibliographic reports.

Comments: As a consequence of the infection, the inflorescence is hardly affected. The symptoms have been described by Maire (1906) and Guyot et al. (1955). We have always observed them in the samples studied and in the field: the inflorescence sheath develops normally but the rachis elongates and remains shorter, equal or longer than the sheath, and surrounded by the spores. (Fig. 1: b-c). In healthy plants there is only one inflorescence-sheath, but in attacked plants a new sheath develops inside the first one, which suffers the same deformation. The phenomenon is repeated many times and gives rise to successive imbricated sheaths. The resulting appearance, with long internodes similar to culms and surrounded by spores, could be the reason why many authors have identified *U. sparti* as *U. hypodytes* in *Lygeum spartum*.

In a recent study, Vánky (1988) states that *Lygeum spartum* can be parasitized by two species: *U. hypodytes* and *U. sparti*, depending on where the infection occurs. Another reason is the spore size, somewhat bigger in *Ustilago sparti*. We consider that the smut fungus on *L. spartum* is always *U. sparti*, causing different degrees of disease in the inflorescence. In every sample studied the attacked organ is the inflorescence and not the vegetative stem, since the inflorescence sheath is formed and belongs to the inflorescence, where it replaces the glumes (Pallarés, 1994). As for the size of the spores, this is very variable even within a single collection (Fig. 2: f). Some samples from Spain showed larger spores than the type collection. This character is thus not useful in the delimitation of the species.

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MYCOTAXON

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THE GENUS THECOTHEUS IN ARGENTINA

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ABSTRACT

Thecotheus pelletieri, T. cinereus and *T. crustaceus* are described and illustrated, with special remarks on cultural features and the development of conidial forms. This is the first record for Argentina and probably also for South America. The entire life-cycle from ascospore to ascospore was reconstructed *in vitro* for the three species. *Sporothrix*-like anamorphs producing holoblastic (botryose) conidia were found for *T. pelletieri* and *T. crustaceus*. *Thecotheus pelletieri* and *T. cinereus* are undoubtedly homothallic species, whereas *T. crustaceus* appears to be heterothallic.

Key words: *Thecotheus*, Pezizales, anamorphs, taxonomy, Argentina.

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INTRODUCTION

The genus ***Thecotheus*** was proposed by Boudier (1869) to include ***Ascobolus pelletieri*** Cr. & Cr., a coprophilous discomycete with large, 32 spored asci. Chenantais (1918) broadened the concept of ***Thecotheus*** to accomodate 8-spored species. Kimbrough (1966) recognized the taxon as a distinct genus in the Pseudoascoboleae. Asci and spore characteristics prompted Kimbrough and Korf (1967) to place the genus ***Thecotheus*** in the tribe Pezizeae (Pezizaceae). Brummelen (1967) erected the subfamily Theleboloideae of the Ascobolaceae to include ***Thecotheus*** and other genera previously placed in the Pseudoascoboleae. Subsequently, Korf (1972) placed it in the tribe Iodophaneae of the Ascobolaceae. Currently ***Thecotheus*** is recognized as a member of the Ascobolaceae.

The genus ***Thecotheus*** comprises species with small, initially white, subconical apothecia, long stalked, cylindrical 8-32 spored asci blueing with iodine, and large frequently apiculate spores with a thick mucilaginous perisporic layer.

In revising the North American species of ***Thecotheus*** Kimbrough (1969) recognized five taxa. Additional ones were added by Pfister (1972, 1981), Kaushal (1980), Krug and Khan (1987), Gené et al. (1993) and Wang (1994). Conway (1975) provides the first study of ascocarp ontogeny and the reference of an imperfect state. Olav Aas (1992) reviewed the genus in his remarkable world monograph of ***Thecotheus.***

During our investigations on coprophilous Ascomycetes from Argentina, three species of ***Thecotheus*** were found. This is the first record of the genus for Argentina and probably also for South America. The species are described and illustrated, with special remarks on cultural characters, life cycle in vitro and the presence of anamorphs.

MATERIALS AND METHODS

This study is based on dung collections of different ages cited in the text and, in all cases, on single-spore cultures of the three ***Thecotheus*** species.

Culture media

For studies on conidial forms or ascocarp development, the following media were routinely used: PF (yeast extract 0.3 %, agar 1.8 %, dispensed in Petri dishes with a filter paper in it), sterilized cow dung (E), sterilized cow dung added to PF medium (E-PF) and glucose-urea (GU) (Ranalli and Mercuri, 1995).

Spore collection and germination

Samples of dung collections were placed in sterile petri-dish moist chambers, incubated at 23 °C under constant light, and observed periodically for ascocarp development. When identified apothecia were mature, petri dishes with 2 % Bacto agar were inverted over dung to collect ascospores. Chemical treatment of ascospores was necessary before germination could occur, and was carried out using the method published by Ranalli and Mercuri (1995). Single-spore cultures were performed after incubation by cutting-off hyphal tips and inoculating slants with PF medium.

SPECIES DESCRIPTION

Thecotheus cinereus (Cr. & Cr.) Chenantais, Bull. Soc. Mycol. France **34:39**. 1918.
Ascobolus cinereus Crouan & Crouan, Ann. Sci. Nat. IV **10:194**. 1858.
(For a complete synonymy, see Aas, 1992).
(Figures **2, 3, 13, 14**)

Apothecia initially white, obconical, becoming pale gray, turbinate, 0.8-1.8 mm diam.; medullary excipulum of *textura globulosa*, isodiametric thin-walled cells 19-24 µm diam. with interspersed ramified hyphae, 7-8 µm diam.; ectal excipulum consisting of more or less polyhedral cells, 10-12 x 12-25 µm (*textura angularis*), with rooting cylindric hyphae, 7-8 µm diam., ending at the surface with a 10-12 µm bulbous thick-walled cell; asci 8-spored, cylindric, long stalked, 210-390 x 30-40 µm, with a well marked, dome-shaped operculum;

ascospores 1-seriate to irregularly arranged, ellipsoid, 28-39 x 13-17 µm, with a thick wall (3-4 µm), and bearing polar apiculi; paraphyses filiform, 3 µm diam., branched or not, septate, enlarged to 6 µm at the tip.

Cultural observations: The optimal treatments for spore germination were: NaOH 0.1% for 20 min, incubation 24 h at 37 °C plus 24 h at 23 °C, and NaOH 0.2% for 15 min, incubation 24 h at 37 °C plus 48 h at 23 °C. With both treatments, 100 % ascospore germination was observed.

Single-spore cultures produced mature apothecia within 15 days of incubation on media E and E-PF, under continuous light at 23 °C. Sterile apothecia were produced on PF medium under the same conditions.

Habitat: On horse dung

Specimen examined: Río Negro. Bariloche. Bahía Kraft. **BAFC 34046.** 01.1987. On horse dung. José R. González Castelain.

Remarks:

Anamorph. Conway (1975) found an "imperfect state in cultures and slants of *T. cinereus*, similar to that of *T. pelletieri"*; nevertheless, no description was provided. In all media assayed, we never found any conidial form, in any culture condition.

Teleomorph. Single-spore cultures developed on E and E-PF media under continuous light at 22-25 °C produced abundant fertile apothecia within 15 days. Conway (op. cit.) found that *T. cinereus* cultures did fruit sparsely in polyspermic cultures and not in single-spore cultures.
These differences observed in *T. cinereus*, as well as mature apothecia colour, could be due to natural strain variations or to methodological artifacts.

Viability, longevity. Spores could germinate within three years of collection and then lost their germination ability. Stock cultures stored for 4 years at 5 °C, produce well-developed apothecia but sterile asci.

Thecotheus pelletieri (Cr. & Cr.) Boud., Ann. Sci. Nat. V **10:236**. 1869.
Ascobolus pelletieri Crouan & Crouan, Ann. Sci. Nat. IV **7:173**. 1857.
(For a complete synonymy, see Aas, 1992)
(Figures **1, 8-12**)

Apothecia initially globose to pyriform, transluscent white, then discoid, cinereus, with irregular undulate margin, 1.5-2.0 mm diam.; medullary excipulum of *textura globulosa*, cells 7-20 µm diam. with scattered filamentous, septate, ramified hyphae, 2-5 µm diam.; ectal excipulum of *textura intricata*, hyphae 3-7 µm diam, septate, branched, ending at the surface in inflated bulbs reaching 15-30 x 5-8 µm; asci 32 spored, slightly blueing with iodine, cylindric to clavate, with a narrow, short stalk, 350-520 x 48-60 µm, and a well marked, flat-convexous operculum at maturity; ascospores 4- to irregularly-seriate, ellipsoid, 14-18 x 36-42 µm, smooth to finely warted, with a mucilaginous perisporic layer; paraphyses filiform, branched or not, 4-6 µm diam, 390-580 µm long, ending in almost spathulate tips reaching 5-9 µm diam.; conidial form *Sporothrix*-like developed from 4-20 branched and coalescent hyphal mycelial strands, 10-90 µm diam.; conidiophore developing laterally, broad at the basis (3.5-5 µm diam.) narrowing towards the apex (1.5 µm diam.), 16-32 µm long.; conidia holoblastic growing in tight 3-20 spherical clusters, pyriform to obovate, 1.9-3.3 x 3.9-5.9 µm.

Cultural observations: Treated ascospores (NaOH 0.1 %, 30 min), germinate (100 %) after 24 h incubation at 37 °C. Single-spore cultures produce apothecia after 15 day growth on E and E-PF under continuous light and 22-25 °C incubation. Mature ascospores were collected at 20-22 days from inoculation.

Habitat: On cow or horse dung.

Specimens examined: Río Negro. Bariloche. Bahía Kraft. **BAFC 34047.** 01.1987. On horse dung. José R. González Castelain.
Buenos Aires. Otamendi. **BAFC 34048**. 08.1994. On horse dung. M. E. Ranalli.
Buenos Aires. Agronomía. **BAFC 34049**. 06.1993. On cow dung. M. E. Ranalli.

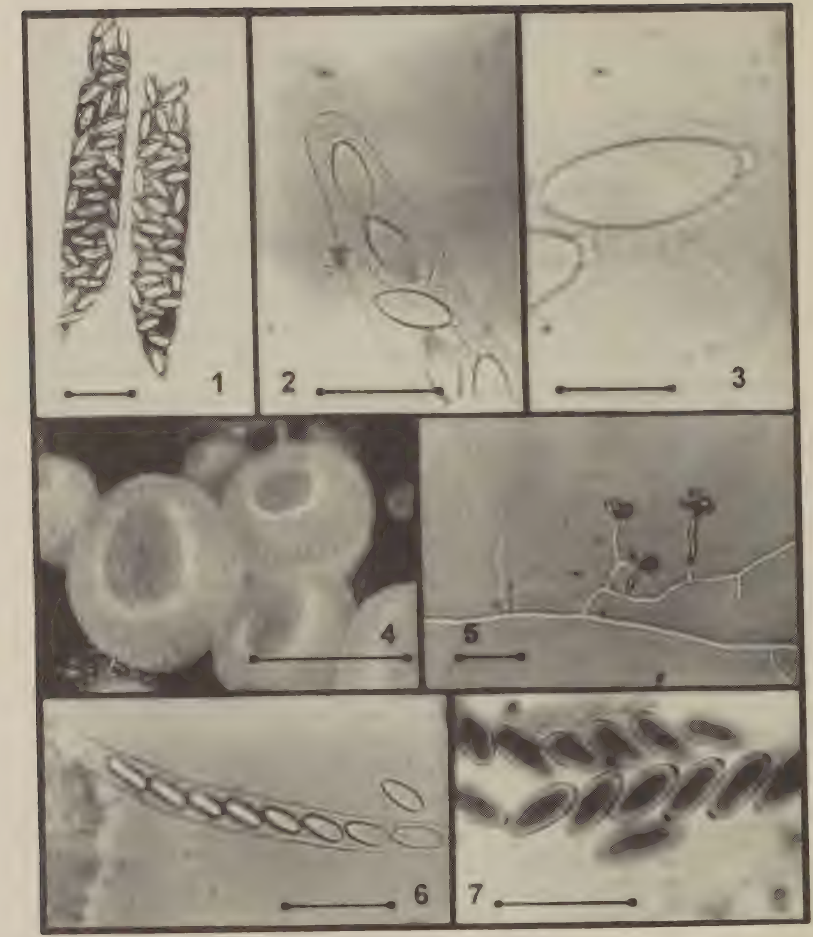


Fig. 1. ***Thecotheus pelletieri***, 32-spored mature asci; **Figs. 2-3.** ***T. cinereus***, **2.** ascus tip showing dome-shaped operculum, **3.** mature ascospore with polar apiculi and mucilaginous perisporic layer; **Figs. 4-7.** ***T. crustaceus***, **4.** different developing stages of apothecia growing in vitro, **6.** conidiophore and conidia growing on 2 % agar, **6.** cylindric 8-spored ascus, **7.** mature ascospores with haematoxylin-stained polar caps. Scale bar: **1, 2, 6** = 50 µm; **3, 6, 7** = 25 µm; **4** = 1 mm.

Remarks:

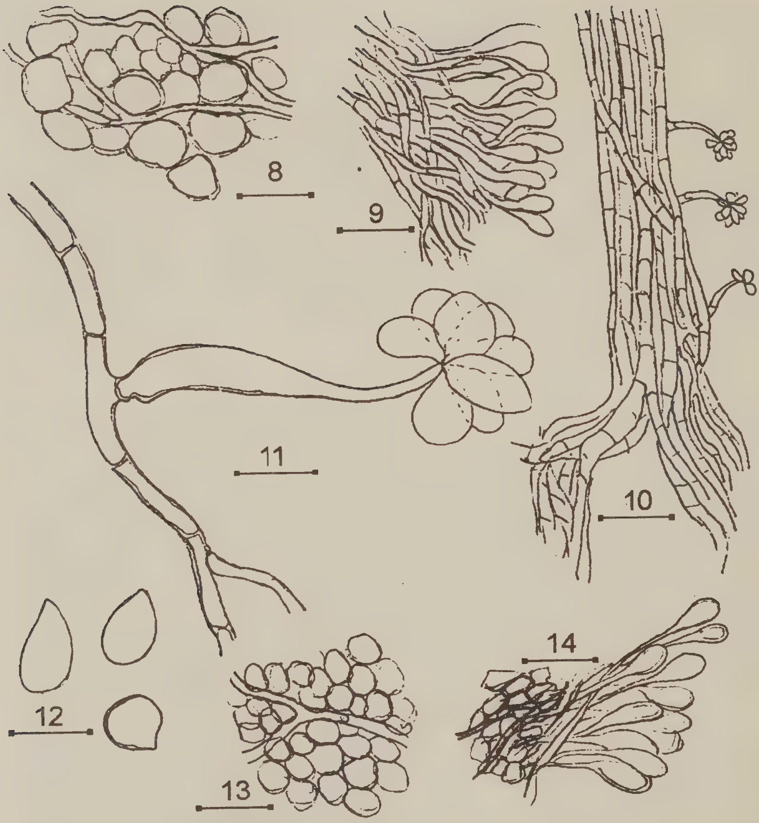
Anamorph. Conidial production was abundant on the assayed media, as observed by Conway (1975). Our observations were quite similar to those described by Conway.

Teleomorph. Conway (1975), found a late appeareance of *T. pelletieri* on dung samples and was unable to induce apothecial formation from single-spore cultures, suggesting the possibility of heterothallism. In our experience, fertile apothecia of *T. pelletieri* appeared after 20-22 days incubation of the dung pellet. Although single spore cultures did fruit rarely on PF medium, we found mature apothecia with fertile ascospores in cultures on E-PF medium after 20-22 days of inoculation from single spore isolates. On this basis, we can state that tested strains of *T. pelletieri* are undoubtedly homothallic.

Thecotheus crustaceus (Starb.) Aas & Lundq., Thesis, Univ. i Bergen, 1992. (For a complete synonymy, see Aas, 1992)

(Figures **4-7, 15-19**)

Apothecia at first white, subconical, becoming pale brown, turbinate to cylindric at maturity, 0.6-1.3 mm diam.; medullary excipulum of *textura intricata* at the base (cells 2-4 x 8-25 µm) becoming *textura globulosa* upwards (cells 8-20 µm in diam.); ectal excipulum of *textura angularis* to *globulosa*, cells thin-walled 8-20 µm in diam., with rooting hyphae ending at the excipular surface with 8-20 µm bulbous thick-walled cells; asci cylindrical, 8-spored, 13-18 x 160-240 µm, wall completely staining with iodine, narrowing towards the base with a short stalk and an indistinct operculum; ascospores 1-seriate, ellipsoid, 7-10 x 16-20 µm, smooth, showing occasionally polar caps staining intensely with haematoxylin and initially surrounded by a thick mucilaginous layer; paraphyses hyaline, septate, branched or unbranched, 2-3 x 150-250 µm, some with expanded tips to 4-5 µm in diam.; conidial form *Sporothrix*-like, developed from mycelial strands formed by 4-15 hyphae 1-4 µm diam, 8-30 µm diam.; conidiophore growing laterally, wider at the base, tortuous, 2-6 x 15-50 µm; conidia holoblastic, pyriform to obovate, 3-5 x 6-10 µm, in 2-10 almost spherical clusters.



Figs. 8-12. ***Thecotheus pelletieri,*** **8.** medullary excipulum of *textura globulosa* with scattered hyphae, **9.** ectal excipulum of *textura intricata* with bulbous-ending hyphae, **10.** mycelial strand with laterally growing conodiophores, **11.** conidiophore with spherical cluster of conidia, **12.** conidia; **Figs. 13-14.** ***T. cinereus,*** **13.** medullary excipulum of *textura globulosa* with interspersed hyphae, **14.** ectal excipulum of *textura angularis* with rooting hyphae ending with bulbous cells. Scale bar: **8, 9, 10** = 25 µm; **11, 12** = 5 µm; **13, 14** = 40 µm.

Cultural observations: The best treatments for ascospore germination were: NaOH 0.1 % for 30 min, or NaOH 0.2 % for 20 min, incubated 24 h at 37 °C, plus 72 h at 23 °C. With these treatments, germination was scarce on Bacto agar 2 % but abundant on rich media such as GU.

Single-spore cultures did not produce apothecia on any media, but when selected compatible strains were cultured on E medium *T. crustaceus* fruited within 15 days.

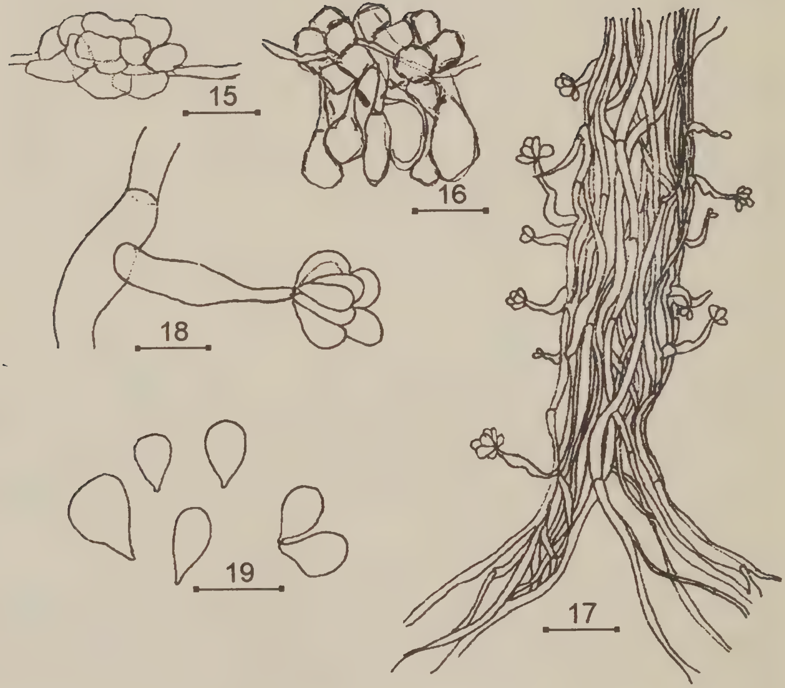
Habitat: on horse dung

Specimens examined: Tierra del Fuego. Bahía Ensenada. **BAFC 34044.** 03.1994. On horse dung. Alicia Godeas.
Buenos Aires. Otamendi. **BAFC 34045**. 08.1994. On horse dung. M. E. Ranalli.

Remarks:

Anamorph. In previously described collections of *T. crustaceus* (Kimbrough, 1969; Brummelen, 1984, Aas, 1992), no data on the conidial stage were presented. We found very abundant conidial production also in poor media such as 2 % agar. Collected conidia germinate without treatment within 5 days at 23 °C and under continuous light, producing a fast growing mycelium which develops in new conidial production.

Teleomorph. According to our observations, *T. crustaceus* is a bipolar heterothallic species. Ascospores were previously described and illustrated without apiculi. But we found young and mature ascospores with haematoxylin-staining polar caps from apothecia developed in dung samples or in vitro cultures.



Figs. 15-19. *Thecotheus crustaceus*, **15.** medullary excipulum of *textura globulosa*, **16.** ectal excipulum of *textura angularis-globulosa* with rooting hyphae ending with inflated thick-walled cells, **17.** mycelial strand with laterally developed conidiophores, **18.** conidiophore with conidial cluster, **19.** conidia. Scale bar: **15, 16** = 25 µm; **17** = 15 µm; **18, 19** = 10 µm.

GENERAL REMARKS

Since Boudier erected the genus in 1869, all the descriptions of the *Thecotheus* species were based on dried herbarium collections or apothecia developed on substrate samples, with no reference to conidial states. The sole previous cultural study of *Thecotheus* was made by Conway (1975).

Some differences between Conway's observations and our findings must be pointed out:

Teleomorph. Conway observed slow growing cultures which produced scarce fruiting for *T. cinereus* or no fruiting for *T. pelletieri*. We were able to reconstruct the entire life-cycle -from ascospore to ascospore- for the three tested species within the 15-20 days of culture in different media.

Single spore cultures of *T. cinereus* and *T. pelletieri* produced fertile apothecia, thus, the species are homothallic (Conway had suggested heterothallism for *T. pelletieri*), whereas *T. crustaceus* appears to be heterothallic.

Anamorph. Conway found the conidial forms of *T. cinereus* and *T. pelletieri*. We observed the anamorphs of *T. pelletieri* and *T. crustaceus*. Although several attempts were made to induce conidiation of *T. cinereus*, none was successful.

The anamorphs observed, seem to be close to *Sporothrix* Hekt. & Perkins, as described by de Hoog (1974) and Cole and Samson (1979), with conidiogenous cells scattered, arising from undifferentiated hyphae, with a cluster of holoblastic (botryose) conidia. However, a high degree of pleomorphism is evident in the *Sporothrix* group, including some species which form hyphal fasciculi with orthotropically arising conidiogenous cells (de Hoog, 1974). Nevertheless, known teleomorphs of *Sporothrix* belong to *Ceratocystis* species.

Holoblastic (botryose) conidia have also been observed in other Pezizales: *Peziza quelepidotia* (O'Donnell et al., 1976), *P. ostracoderma* (Hughes and Bisalputra, 1970) and species of *Peziza* and *Iodophanus* with *Oedocephalum* conidial states (Gamundí and Ranalli, 1964; Stalpers, 1974).

Some cultural features that we observed must be referred to the methods used, since culture media and incubation conditions play an important role in fungal differentiation by conditioning the final morphological and physiological expression.

AKNOWLEDGEMENTS

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BOOK REVIEWS

Eric H.C. McKenzie, Book Review Editor

Macrolichens of the Pacific Northwest by Bruce McCune and Linda Geiser. Photographs by Sylvia and Stephen Sharnoff; drawings by Alexander Mikulin (1997). xiv + 386 pp. 21.5 x 14 cm. Oregon State University Press, 101 Waldo Hall, Corvallis, Oregon, 97331-7407, U.S.A. ISBN 0-87071-394-9. US$25.95.

The lichens of the West Coast of North America were first collected by the Scottish botanist Archibald Menzies in the late 18th century, and made known to the botanical world by the Swedish lichenologist Acharius in his book *Methodus qua omnes detectos Lichenes*... (1803) which described six lichens from the forests of the Pacific Northwest, viz., *Parmelia lophyrea* (= **Cavernularia lophyrea*), *P. duplicata* (≡ **Hypogymnia duplicata*), *P. enteromorpha* (≡ **H. enteromorpha*), *Baeomyces acicularis* (≡ **Pilophorus acicularis*), *Cetraria lacunosa* (≡ **Platismatia lacunosa*), *Sticta anthraspis* (≡ *Pseudocyphellaria anthraspis*), five of which (marked *) are illustrated in this book. Two hundred years after their discovery, Bruce McCune and Linda Geiser showcase these, and many other associated lichens, in their timely and useful guide to the macrolichens of the Pacific Northwest. Macrolichens, in the authors' definition "... include foliose, fruticose and the larger squamulose forms". That is, all lichens that can be identified either by the unaided eye or with a x 10 handlens, some simple chemical tests, and most importantly, the keys and descriptions provided in this book.

McCune and Geiser are biologists who have particular interests and affection for lichen ecology; of the place and role of lichens in the various biomes in which they occur, and especially those of the forests of the Pacific Northwest. The very first paragraph succinctly expresses the limits of their book, incidentally the first comprehensive guide to the region's macrolichens: "...This book can be used to identify macrolichens from Oregon and Washington. All fruticose and foliose lichens known or expected to occur in these two states are keyed. Illustrations and detailed descriptions are provided for 210 species, emphasizing lichens prevalent in forested ecosystems, regionally common lichens, and rare species of special concern. An additional 285 species are keyed or noted. Reasonable coverage for lichens of Idaho and Montana, inland to the Continental Divide can be expected".

Introductory pages cover basic essentials such as: What are lichens?; Why are lichens important? [a fine introduction to a still grossly neglected study area]; How lichens work; Growth forms and structural features; Reproduction, growth and dispersal. An illustrated glossary at the end of the book adds pertinent, concise explanations to amplify these introductory concepts.

The bulk of the book consists of keys to genera, and descriptions of genera and species.

Nine generic keys are arranged according to fungal phyla (predominantly Ascomycota with only two Basidiomycota), texture, colour, nature of photobiont, and growth form. Keys are indented, concise and easy to follow, and identifications can safely be made without resort to any microscopic characters, thus underlining the book's utility as a guide in the field. An alphabetical arrangement of genera (and species within genera), from *Ahtiana* to *Xanthoria,* covers 92 genera and 458 species of macrolichens from Oregon and Washington, all of the macrolichens known or expected to occur in the two states. Genus descriptions are qualified in most cases by references to relevant contemporary (and readily accessible) literature listed in the References. Species descriptions are given for all illustrated lichens, together with details of range, substrate, habitat, and notes which amplify differences between related taxa. I found the descriptions concise but apt, with no wasted words, no padding and no jargon.

Taxonomy in the main follows Esslinger & Egan's Sixth Lichen Checklist (*Bryologist 98*: 476-549, 1995) with authorities of accepted taxa and synonyms listed in Appendix I. Additional appendices cover collection, identification and curation of lichens, the use of chemical "spot tests" as an identification aid, and a discussion of lichens as pollution monitors. The Bibliography casts a wide net, is up-to-date and authoritative, though not all of the references listed are mentioned in the text.

The colour plates (there are 203 of them including the cover) are stunningly beautiful, and quite the most life-like of lichen photographs that I have seen, the colour rendition of often very subtle hues and textures quite wondrously caught by the camera, and beautifully rendered by the printers. The photographs are pin-sharp throughout, very attractively composed, and show clearly the requisite taxonomic characters for easy and unequivocal identification. Not all modern colour lichen photography achieves this at times extremely difficult aim, but here (as in their earlier published work) Sylvia and Stephen Sharnoff succeed brilliantly - their contribution will play a vital part in the success of this book. Alexander Mikulin"s drawings generally succeed very well in showing macroscopic and microscopic details of importance in species recognition.

In sum, a very well-produced book at an extremely competitive price, which should make the beauty and diversity of the macrolichen mycobiota of the Pacific Northwest strongly appealing to a wide range of users from professional lichenologists to field naturalists, students, school children, and the public at large. The clarity of the text and the excellence of the photographs should guarantee the book a large audience among lichenologists worldwide, and from the personal perspective of a Southern Hemisphere lichenologist interested in lichen mycobiotas of cool temperate biomes, it is a most welcome addition to my bookshelf.

I recommend this book unreservedly, and congratulate authors, illustrators and publishers on a fine achievement. Archibald Menzies would have most certainly approved!

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European species of the genus* Boletus *on CD-ROM edited by G. Acquaviva, L. Lanconelli, and M. Rava (1996). A funghi col PC. Il genere *Boletus*. (In Italian). Faenza (Italy), Studio Progetto. Approx. 400 Mb CD-ROM. Preview on Web site at http://www.arcobaleno.com/progetto/. Orders to: Studio Progetto Snc, Via Fadina 19, 48018 FAENZA (RA), Italy (e-mail: gacquaviva@racine.ra.it). Lire 50,000 (US$35) + delivery costs.

This electronic work on the ectomycorrhizal genus *Boletus* (*sensu stricto*) is advertised as the first stand-alone mycological publication on CD-ROM - there is no equivalent paper-based publication. Now you can journey on a multimedia fungal foray on your PC-computer and seek information on 27 European species of *Boletus* and their 8 host trees. *Boletus edulis* has only recently been recorded in the South Island of New Zealand (Wang *et al*. 1995), so I used this CD-ROM as an opportunity to discover basic information about the genus.

The minimum requirements to run this CD-ROM are a 486-CPU computer with an operating system of either Windows 3.xx, Windows 95, or OS/2, plus 8 Mb RAM, a 640 x 480 graphics card, a hard disk with at least 5 Mb free space, and a CD-ROM drive. The setup program installs either the Asymetrix ToolBox runtime system alone (approx. 4 Mb), or the executable program as well (approx. 80 Mb) on the hard drive of your computer.

The editors designed the contents of this CD-ROM with both mushroom enthusiasts and expert mycologists in mind. About 350 colour photographs complement the text. The CD-ROM starts with a 2 minute 20 second video providing overview information on the project (may be bypassed by clicking the mouse button on the video), and then the main menu screen appears. The information is accessed through 6 sections: anatomy, general information, species information, dichotomous key, host trees, and recipes.

The anatomy section displays an illustration of a specimen with labelled parts and hypertext links to the glossary (definitions plus photographs). Those with audio can activate the person-icon and view this information as a slideshow lecture presentation. The general information section gives information about the project, lists the people involved, provides two alternative classifications for the order Boletales, a glossary, and a bibliography of 12 references (predominantly Italian field guides).

Each of the 27 species covered in the species information section has 1-11 index photographs associated with it. These excellent photographs can be enlarged to fill much of the screen, and many have areas of the photograph which can be further enlarged to show close-ups of individual specimens or parts of specimens. As well there is text information for each species, which can be printed out, covering diagnostic features, edibility, variability, and references. Ten species have photographs of spores displayed at 1000-2300 times actual size. Selecting the tree-icon on the page brings up index photographs of the hosts for that species; clicking on a tree photograph then takes you to information about that tree and *Boletus* species symbiotic on it. The dichotomous key section is based on macroscopic features of species. Alternative features for a couplet are displayed; you choose one, and are taken to the next couplet choice. Once you have identified a species, you are shown a photograph of it, and can then access information on it. If you decide you have made an incorrect choice, there are navigation arrows enabling you to retrace your steps.

The section on host trees gives information on the 8 trees and the species of *Boletus* symbiotic with them; e.g., *Picea abies* (L.) Karsten has 8 species listed. As you move the cursor over a *Boletus* species name an index photograph for that species is displayed. Click on the name itself, and you are taken to the species information page for that *Boletus* species and all the photographs associated with it; click on the return navigation button and you return to the appropriate host tree page. The final section, by J. V. Stagioni, provides 11 previously unpublished recipes using *Boletus* in cooking. Few cooks will have computers in the kitchen, so it is unfortunate you cannot print the recipes directly.

This publication shows some of the strengths of multimedia publishing. The ability to cross-reference information is far easier on this CD-ROM than using a book index. The large number of colour photographs, which are a strength of the publication, would result in a very expensive paper-based publication if all were included. This CD-ROM is in Italian only, but future editions will include English and other languages as options referencing the same photographs.

Some improvements could be made to the CD-ROM to enhance its usefulness. Details on how to cite this publication are not clear. For this review citation data were gleaned from the CD-ROM, the Web site, and from Signor Acquaviva. It would be helpful to have a printable list of the species covered, and to be able to access species information directly from such a list. The abbreviations used for references on the species information pages are not intuitive, and they are not hypertext linked to the references. There is no indication of scale associated with most photographs. When there is more than a screenful of text for a page you need to activate an arrow-icon to scroll through it line-by-line to see the remaining text; it would be simpler to press the 'PageDown' key and obtain the next screen of text. There is no built-in button to print copies of the photographs; if you want copies of photographs to compare species you need to grab an image using the 'Print Screen' key, and paste it into a program such as Corel PhotoPaint for printing.

This publication provides a good example of how biological information can be delivered electronically, and the visual power of superb photographs to convey information. However, if you want fuller descriptive text and more complete taxon coverage then a publication like Alessio (1985) should be consulted to complement this CD-ROM. Its modest cost should make the CD-ROM affordable for mycological libraries and mushroom enthusiasts alike.

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NOTICE: EDITOR-IN-CHIEF BIDS ADIEU

The close of *Mycotaxon* volume 67 marks the end of my tenure as Editor-in-Chief. To mark the occasion, I wish to acknowledge those who contributed to the success of the journal during the last eight years, index editors, Robert Dirig, Karen D. Gettelman, Ian F. Korf, Susan C. Gruff, book review editors, Linda M. Kohn, David S. Hibbett, Eric H. C. McKenzie, the members of the Editorial Advisory Board, my assistant and sucessor, Pavel Lizoň, and especially the journal's co-founders, Grégoire L. Hennebert and Richard P. Korf.

To the many reviewers who gave generously of their time and attention to *Mycotaxon* manuscripts, I express my sincerest gratitude. Most of all, I wish to acknowledge the authors of *Mycotaxon*. It is by their dedication and hard work that *Mycotaxon* has become the international forum for research on fungal taxonomy and nomenclature that it is today. To all the mycologists around the world with whom I have corresponded as Editor-in-Chief, I bid adieu.

Place names from authors' addresses appearing in *Mycotaxon* volumes 41-67

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Good luck in your future mycological endeavors,

Jean B Cargill

Jean Boise Cargill, *Ph. D.*
Editor-in-Chief, Mycotaxon

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This index includes names of genera, infrageneric taxa, species, and infraspecific taxa, as well as new names of suprageneric taxa. All new names are in CAPITALS. The page number on which a new name is proposed is followed by an asterisk (*). Attention is drawn to the paper entitled "A list of discomycetes in China,"on pp. 365-390, itself an alphabetical index and not indexed here.

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ERRATA

VOLUME SIXTY-SEVEN

Page 257, line 20	for *S(porocadus) longestipitaus*	read *S(porocadus) longestipitatus*
Page 282, line 1	for *Sclerotium orobanche*	read *Sclerotium orobanches*
Page 287, line 10	for *S(tirtonia) marginta*	read *S(tirtonia) marginata*
Page 345, line 11	for *L(achnum) pteridphyllum*	read *L(achnum) pteridophyllum*
Page 449, line 36	for *Lycoperdon pusilllum*	read *Lycoperdon pusillum*
Page 450, line 33	for *Pisolitus*	read *Pisolithus*
Page 458, line 4	for *Pertusaria pulcheretincta*	read *Pertusaria pulchertincta*

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